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EXTENDED TASK ANALYSIS PROCEDURE (ETAP). USER'S MANUAL.(U)
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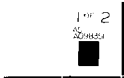

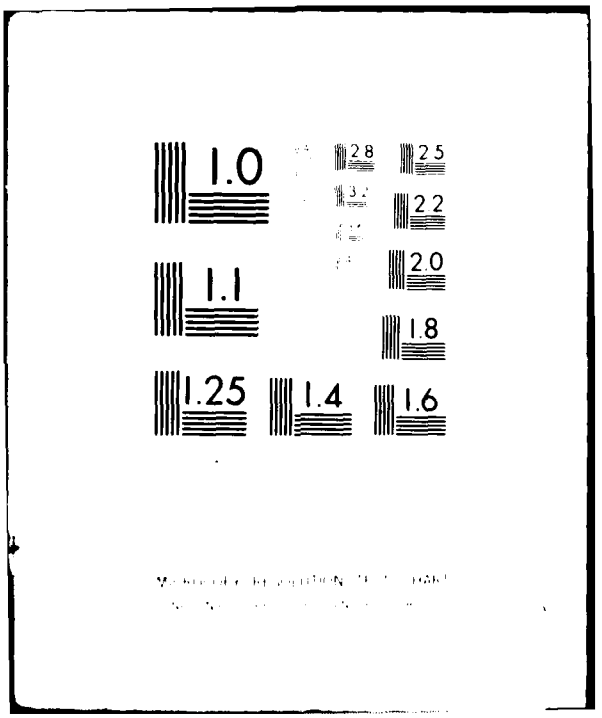
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EXTENDED TASK ANALYSIS PROCEDURE

ETAP

USER'S MANUAL

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For

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This material was prepared for use by the Army Training Development Institute.

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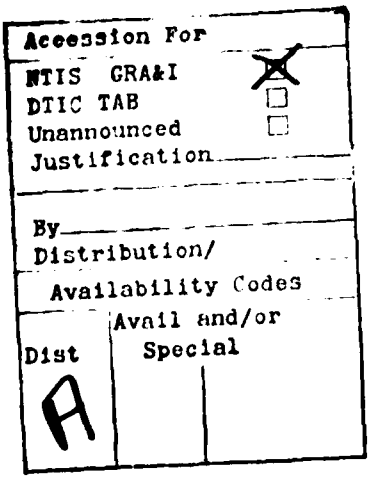

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Factor Transfer Analysis
Principle - Transfer Analysis
Process Analysis

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Extended Task Analysis Procedure (ETAP) is a 12 step process designed to analyze tasks that are primarily procedural in nature and tasks that are usually called "Soft Skill" Tasks. This report is designed to assist the analyst to do an Extended Task Analysis (ETAP). It is a handy reference for anyone who has already completed training in the use of ETAP.

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CONTENTS

INTRODUCTION

Extended Task Analysis is a procedure for identifying the component skills and knowledges which must be learned if the whole task is to be mastered. The procedure meets the needs of both task description and subsequent instructional design.

Analyzing Procedural Tasks

You are probably familiar with hierarchical task analysis. In hierarchical task analysis you start with the terminal performance and ask, "What does the student need to be able to do, given only directions, in order to perform this task?" The answer to this question provides the prerequisite skills and knowledge needed to learn the task. The repeated application of this analysis procedure results in a task or objectives hierarchy.*

You may also be familiar with information processing analysis. This procedure involves describing the steps involved in the terminal performance including sequence, decision steps, and branches.*

The extended task analysis procedure (ETAP) combines hierarchical task analysis and information processing analysis with other techniques to provide a comprehensive analysis procedure. There are three distinct phases used in the analysis of procedural tasks. The first is process analysis (information processing analysis). This phase involves the identification of each of the steps in a procedure, arranging these steps in the correct order of execution, identifying any decision steps and alternative sequences of steps (branches) which result from the decision, and representing this process by means of a flow chart.

The second phase is substep analysis in which the activity represented by each step in the process analysis is further analyzed into its component substeps. This more detailed analysis is a repetition of process analysis for each step in the original flow chart. Substep analysis is repeated until the resulting step size is in terms of skills which the student has already acquired prior to undertaking training.

*. See Gagne, Robert M. and Briggs, Leslie J. Principles of Instructional Design, 2nd ed. Holt Rinehart and Winston: New York, 1979. Chapter 6.

Finally, extended task analysis involves knowledge analysis. Not all prerequisite skills or knowledge are best represented as procedures. Some of the prerequisite information needed to perform a task involves knowing facts or pieces of data. Some of the prerequisite information requires the student to identify objectives or events as to their class membership. Identification of this prerequisite knowledge requires hierarchical analysis in which each step from the flowcharts generated by the process and substep analyses is submitted to the question, "What does the student need to know in order to perform this step?" The resulting knowledge can be facts or concepts. Knowledge analysis is repeated for the resulting concepts in order to identify the prerequisite knowledge required for classification. Knowledge analysis is repeated until each of the identified concepts is one already mastered by the student prior to instruction.

Extended task analysis results in a multi-dimensional representation of the learning task. This representation includes a process flowchart showing the sequential steps necessary to execute the task, including decisions and branches. Each step in the process flowchart is further broken down into component substeps. This substep analysis is repeated until basic skills are revealed. Finally, each step is analyzed to reveal component facts and concepts which the student must know in order to execute the step.

You may find that learning extended task analysis takes extra time, but after a while you will find that this up front investment of time will yield large dividends in the amount of time you will subsequently save, in the quality and usefulness of the analysis, and in a reduced need to go back and redo parts of the analysis.

Analyzing Transfer Tasks

In addition to information processing analysis and the two forms of hierarchical analysis just described, entended task analysis also includes a method for analyzing more complex tasks which are not easily analyzed using only process analysis, substep analysis and knowledge analysis. Some tasks, called transfer tasks (or "soft skills"), are difficult to proceduralize. ETAP includes a method for analyzing transfer tasks which will save you considerable time and frustration and will result in a more useful analysis.

A transfer task is one for which the procedure for executing the activities involved varies each time the task is performed. In some situations, it is more efficient for the soldier to learn the principles which underlie the

performance rather than to learn a specific procedure. Each time the task is performed the soldier then derives a procedure which is appropriate to that particular set of circumstances. Extended task analysis includes a method for determining the underlying principles for such tasks.

Some tasks require a different procedure each time the task is performed because of the many conditions and circumstances which vary in each situation. These constraints, limitations, and conditions are called factors. For these tasks it is difficult to teach the soldier all of the many procedures which result from the many combinations of factors which can occur. It is more efficient to teach the soldier to recognize the various factors involved and to have the soldier derive an appropriate procedure for a particular situation depending on the factors involved in that situation. Extended task analysis also includes a method for identifying the factors involved in these complex task situations.

Many military occupational specialities have few or no transfer tasks. Hence, these methods for analyzing transfer tasks will not need to be learned by all analysts. However, for those who will encounter transfer tasks, a moderate investment of time in learning these methods will yield tremendous dividends in the amount of time you will save during analysis, the quality and usefulness of the analysis, and a reduced need to go back and redo parts of the analysis.

Mixed Analyses

The analysis of a single task may require the use of more than one type of analysis. For instance, a task may be broken down into steps using process analysis, substep analysis, and knowledge analysis. One of the resulting steps may be difficult to further proceduralize; it may be best analyzed as a factor-transfer or principle-transfer activity. ETAP is uniquely designed to handle such mixed tasks.

Summary

Extended task analysis is an effective method to use for a wide variety of tasks. First, because ETAP includes methods for analyzing procedural, factor-transfer, and principle-transfer tasks, it can be used effectively with any MOS.

Second, since ETAP incorporates the use of one type of analysis procedure within another, the resulting task analysis is more inclusive, specific, and complete than task

descripions resulting from other analysis procedures.

Third, ETAP distinguishes the steps, factors, or principles necessary to perform the task and between the types of skills and knowledges required in order to learn the steps, factors, or principles. This methodology allows the analyst to be certain that the prerequisites are accurately related to the skills and knowledges used in the task.

HOW TO USE THIS MANUAL

The User's Manual has been designed to assist the analyst to do an Extended Task Analysis (ETAP). It is a handy reference for anyone who has already completed training in the use of Extended Task Anlysis. If you have not completed training in the use of ETAP, you may find it difficult to use this guide.

FORMAT

Two levels of description:

For an overview of ETAP, go to the general description on pp. 11-15. This overview can be used as a job aid when you are ready to use ETAP.

For a more detailed presentation of ETAP, go to the detailed description on pp. 17-94. This presentation contains detailed examples to illustrate the conduct of ETAP.

For additional examples and practice, consult the ETAP Training Manual.

The Process

ETAP is described as a sequence of action and decision STEPS. Executing each STEP until finished will result in a completely analyzed task.

There are twelve STEPS in ETAP. These are briefly described and illustrated in the General Description of ETAP on pages 7 through 11.

Four specific task analysis procedures are used in ETAP. These are called Process Analysis (STEP 3), Factor-Transfer Analysis (STEP 6), Principle-Transfer Analysis (STEP 8), and Knowledge Analysis (STEP 10).

The four procedures are combined with the other eight action and decision STEPS to form three general task analysis methods. These, as illustrated in the flowchart on page 96, are Procedural Analysis, Factor-Transfer Analysis, and Principle-Transfer Analysis.

Each of the twelve ETAP STEPS has numerous subSTEPS. All STEPS and subSTEPS are illustrated and described in the Detailed Description part of the User's Manual.

Page Layout

For the General Description section, the flowchart appears on the left-hand page. The general description of each STEP starts on the facing page and continues for the next several pages.

In the Detailed Description part of this manual, each STEP in the general flowchart is treated in a separate section. Each of these sections contains four kinds of information. The first left-hand page contains a FLOWCHART which shows the subSTEPS which comprise the more general STEP. The facing page contains a description of the subSTEPS which comprise the more general STEP. When necessary, the description of the STEPS continues on the next left-hand page. REMARKS which make additional comments on the procedure follow the description of the steps. These remarks are referenced by the description of the subSTEPS. Finally each section concludes with a REFERENCE EXAMPLE which illustrates that part of the analysis process. The example is referenced back to the flowchart and the description of the STEPS by marginal notes.

You should not try to read each page in turn as you would read a novel. Usually it is best to read the STEP description first and then look at the FLOWCHART, REMARKS, and EXAMPLE for clarification.

SPECIAL FEATURES

ETAP STEPS vs. task steps:

STEPS in the analysis process are indicated by upper case letters. (e.g., STEP 10. CONDUCT A KNOWLEDGE ANALYSIS)

Steps for the task being analyzed are indicated by lowercase or mixed case letters. (e.g., Step 3. List the items in the inventory)

Numbering Conventions:

Both STEPS and subSTEPS are refered to in the manual by the general term STEP. An Arabic numeral to the left of the decimal point designates a particular STEP (e.g., STEP 3.), while an Arabic numeral to the right of the decimal point designates a subSTEP which is a part of a more general STEP (e.g., STEP 3.7 is a subSTEP of STEP 3.). For a more detailed explanation of the numerical and diagramatic conventions used,

the user should consult pp. 93-95 of this manual.

Asterisk*

Technical terms used in the procedure are identified by an asterisk (*) following the first appearance of each such term in any STEP. All such terms are defined in the Glossary of the manual. For a more detailed definition or explanation, the user should consult the Training Manual.

Double Asterisk**

Specific STEPS whose execution may be particularly difficult and/or time-consuming are identified with a double asterisk (**) immediately before the STEP number (e.g., **STEP 5.9). The user should anticipate the need for additional time and/or effort in completing these STEPS.

SUGGESTIONS FOR USE

Remember the details

You should learn the procedure well enough that you will not need to refer to the detailed guide during analysis. The analyst who is uncomfortable with working independently of the printed text should practice following the procedure until he or she feels confident about using ETAP without referring to the User's Manual.

A Training Manual is available to help you master the Extended Task Analysis Procedure.

The general discription section of this Manual may be used as a job aid. A flowchart, general description of the twelve STEPS of ETAP, and performance questions to aid in reviewing the results of your analysis efforts may be found on pages 11-26.

GUIDE FOR THE USE OF THE

EXTENDED TASK ANALYSIS PROCEDURE (ETAP)

GENERAL DESCRIPTION

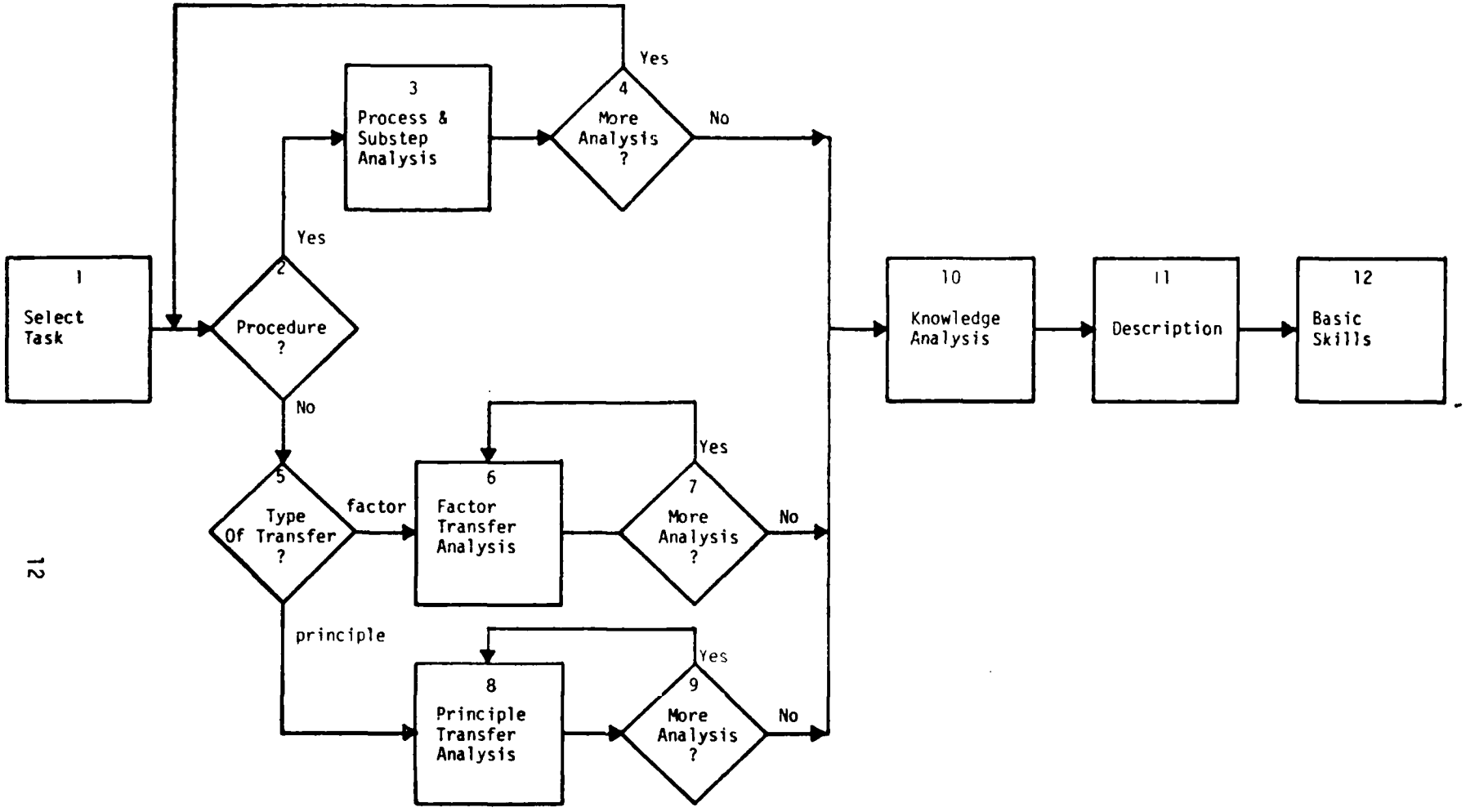
This section describes each of the 12 STEPS involved in Extended Task Analysis. The three major analysis methods: procedural analysis, factor transfer analysis, and principle transfer analysis, are also identified in the flowchart.

The following section, page 11, provides a more detailed description of the substeps involved in each of the analysis procedures.

This section can be used as a job aid as you conduct an analysis. The general description contains a brief introduction to each of ETAP's four analysis techniques, a general description of each of the 12 STEPS, and a checklist to guide performance of each STEP. A complete flowchart of all SUBSTEPS concludes this section.

Extended Task Analysis

General Description



EXTENDED TASK ANALYSIS

GENERAL DESCRIPTION

STEP 1 SELECT TASK (more detail p. 33).

Choose a task for analysis.

STEP 2 IS TASK A PROCEDURE? (more detail p. 35)

If it is procedural, go to STEP 3.

If not, go to STEP 5.

CHECKLIST

2. Can the task be broken down easily into a set of steps?

PROCEDURAL ANALYSIS (STEPS 3. and 4.)

Process Analysis is a technique for determining the action steps in a procedudral task or duty. When repeated to determine the action substeps in a given step, the technique is called Substep Analysis. In either case, component actions are identified, the sequence for performing the actions is indicated, decision steps are distinguished from the execution steps, and alternative branches are indicated.

STEP 3 CONDUCT A PROCESS ANALYSIS (more detail p. 21).

Given a duty, task, or task element, describe, at the next more detailed level of description, the steps for doing a complete performance of the activity. Make sure they are in the correct procedural order. Identify all decisions and branches. Then go to STEP 4.

CHECKLIST

3. Have all the steps and substeps been described and ordered?

   3.1 Is each step described as a direction to perform, using an action verb?

   Are the steps arranged in logical and optimal sequence?

   Are parallel steps indicated, using a flowchart?

   Are sequentially prerequisite steps indicated, using a flowchart?

   Do parallel steps have either a common prior step or a common following step?

   3.2 Are all decision points, at which choices must be made about how to perform the activity, identified?

   3.3 Does each decision step have two or more branches which indicate alternative paths through the task?

   3.4 Does the flowchart or description of the task

clearly identify all execution steps, decsion steps, parallel steps, and sequentially prerequisite steps?

3.5 Are all steps at a particular level of analysis described at the same level of detail?

3.6 Have all critical steps been identified and provided with additional steps to check the performance of the critical step?

STEP 4 IS SUBSTEP ANALYSIS NECESSARY? (more detail p. 45).

If any of the steps described in STEP 3 are on too general a level of description for the lowest-ability entering soldier to be able to perform, go to STEP 2.

If no further substep analysis is necessary, go to STEP 10.

CHECKLIST

4. Can the steps described in STEP 3 be described at a greater level of detail?

4.1 Does a job aid exist for any of the steps?

4.2 Can the lowest-ability entering soldier perform any of the steps without further training?

4.3 Can a step be further divided into substeps?

4.4 Can the lowest-ability entering soldier use the job aid without further training?

4.5 Have those steps and job aids which can be performed or used by the lowest-ability entering soldier been marked to indicate that no knowledge analysis is necessary?

4.6 Have those steps and job aids which cannot be peformed or used by the lowest-ability entering soldier been submitted to further substep analysis (using STEPS 3.1 - 3.6)?

Note: After process analysis is complete, all steps, except those marked as requiring no knowledge analysis, are submitted to knowledge analysis (see STEP 10).

FACTOR-TRANSFER ANALYSIS (STEPS 6. and 7.)

Factor-transfer analysis is a technique for analyzing those tasks in which performance depends on the consideration of a large number of conditions, characteristics, or other factors. Factor-transfer analysis enables the analyst to identify these specifying decision rules and priorities for considering the factors.

STEP 5 IS TASK FACTOR-TRANSFER OR PRINCIPLE-TRANSFER? (more detail p. 67).

If it is factor-transfer, go to STEP 6.

If it is principle-transfer, go to STEP 8.

CHECKLIST

5. Is this a task in which a large number of conditions or other factors affect the execution of the activity?

STEP 6 CONDUCT A FACTOR-TRANSFER ANALYSIS (more detail p. 53).

Identify and list: all of the factors that may need to be considered in order to perform the activity well; the decision rules for each factor; all their common rules for deciding which factors should be considered when combining all relevant factors in making the decision. Then go to STEP 7.

CHECKLIST

6. Have the underlying factors been identified?

   6.1 Have all important factors been identified?

   6.2 Have statements about when to use each factor (decision rules) been stated?

   Have these decision rules been arranged in order of importance?

   6.3 Has a common rule which determines when to use each factor or set of factors been identified and stated?

STEP 7 IS FURTHER SUBFACTOR-TRANSFER ANALYSIS NECESSARY? (more details p. 73)

If any factors listed in STEP 6 need to be analyzed, repeat STEPS 6 and 7 for each.

If no further subfactor-transfer analysis is necessary, go to STEP 10.

CHECKLIST

7. Does use of the factors described in STEP 6 depend on other factors?

   7.1 Does a job aid exist for any of the factors?

   7.2 Can the lowest-ability entering soldier use the factors without further training?

   7.3 Can the factors be subdivided into other factors?

   7.4 Can the lowest-abililty entering soldier use the job aid without further training.

   7.5 Have those factors and job aids which can be used by the lowest-ability entering soldier been marked to indicate that no knowledge analysis is necessary?

   7.6 Have those job aids which require additional training been marked for process analysis (STEP 8)?

   7.7 Are there other factors which must be submitted to further subfactor analysis?

Note: After factor-transfer analysis is complete, all factors, except those marked as requiring no knowledge analysis, are submitted to knowledge analysis (STEP 10).

PRINCIPLE-TRANSFER ANALYSIS (STEP 8 and 9)

Principle-transfer analysis is a technique for analyzing those tasks in which performance varies so much with different situations that teaching all the possible procedures which could be used is impractical. Principle-transfer analysis enables the analyst to identify cause-and-effect relaionships which underlie all of the various apropriate procedures. This technique also assists the analyst to identify a common procedure or strategy for selecting an appropriate procedure to use in a given situation.

STEP 8 CONDUCT A PRINCIPLE-TRANSFER ANALYSIS (more detail p. 73).

Identify and state (at the appropriate level of complexity) all the categories of principles, all the major principles within each category, and all common procedures that are necessary for generating the right procedure at the right time for performing the activity well. Then go to STEP 9.

CHECKLIST

8. Have all the underlying principles been identified?

   8.1 Have all categories of principles been identified and listed?

   8.2 Have the most important or common principles in each category been identified and listed?

   8.3 Has each principle in each category been stated at a level of description appropriate for performing the activity successfully?

   8.4 Has a strategy or common procedure for generating specific procedures to be used in specific situations been described?

STEP 9 IS FURTHER PRINCIPLE-TRANSFER ANALYSIS NECESSARY? (more detail p. 95)

If there are any principles listed in STEP 8 that have not been analyzed, repeat STEPS 8 and 9.

If no further principle-transfer analysis is necessary,

go to STEP 10.

CHECKLIST

9. Do any of the principles or categories of principles identified in STEP 8 require further analysis?

   9.1 Does a job aid exist for any of the categories of principles?

   9.2 Can the lowest-ability entering soldier use the common procedure without further training?

   9.3 Can the lowest-ability entering soldier use the job aids without further training?

   9.4 Have the job aids or common procedure which do not require further training been marked to indiate that no knowledge analysis is necessary?

   9.5 Have those job aids requiring further training been marked to indicate that process analysis (STEP 3) is required?

   9.6 Are there any other categories of principles which must undergo further principle-transfer analysis?

Note: After principle-transfer analysis is complete, all categories of principles, except those marked as needed no knowledge analysis, are submitted to knowledge analysis (STEP 10).

KNOWLEDGE ANALYSIS (STEP 10)

Knowledge analysis is a technique for identifying facts, concepts, and other information which the soldier must know before a step can be performed. Knowledge analysis is alwas used with each of the other analysis techniques. Usually, knowledge analysis follows process analysis, factor-transfer analysis, and principle-transfer analysis.

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS (more detail p. 33, 57, 81)

For each step, factor and principle, identify and list all knowledge (i.e. all facts, concepts, and principles) that

- must be learned before the step can be performed to criterion, and
- have not been acquired by soldiers who are at the minimum acceptance level.

Then go to STEP 11.

CHECKLIST

10. Have all underlying knowledge (facts, concepts, and other information) been identified for each step, factor, principle, and job aid that requires knowledge analysis?

    10.1 Have those steps, factors, principes, and job aids which require knowledge analysis been identified?

    10.2 Is the prerequisite knowledge a procedure, a set of factors, or a principle?

    10.3 Have those steps, factors, principes, or job aids requiring prerequisite procedures been marked for process analysis (STEP 3)?

    Have those requiring prerequisite factors been marked for factor-transfer analysis (STEP 6)?

    Have those requiring prerequisite principles been marked for principle-transfer analysis (STEP 8)?

10.4 Has each prerequisite fact, concept, or other information been identified?

Has each piece of knowledge been labeled as fact, concept or other? Is the step to which the information is prerequisite clearly indicated?

10.5 Has each concept been submitted to further knowledge analysis to determine prerequisite characteristics until the information identified is that which is known by the lowest-ability entering soldier?

Has each fact been submitted to further knowledge analysis to determine prerequisite information until the information is that which is known by the lowest-ability entering soldier?

10.6 Is there a job aid which provides the necssary information?

10.7 Can the job aid be used by the lowest-ability entering soldier without further training?

10.8 Does the job aid require the soldier to learn a procedure for using it?

10.9 Have those job aids requiring the soldier to learn a procedure been marked for process analysis (STEP 3)?

10.10 Are there any steps, factors, principles, or job aids which require a knowledge analysis which have not yet been submitted to knowledge analysis?

Note: After knowledge analysis is complete, a final description, with flowcharts and numbering conventions, should be prepared for the analysis (STEP 11).

PREPARING THE FINAL REPORT (STEPS 11 and 12)

After the analysis is complete, it should be reviewed to be sure that any pieces marked for additional analysis have been analyzed. An independent analyst or subject matter expert should check the analysis for completeness and accuracy. The description of the analysis should be reviewed for adequacy of presentation. All basic skills should be identified.

STEP 11 DESCRIBE THE RESULTS OF THE ANALYSIS (more detail p.105).

Complete all analyses that remain. Then review the entire analysis for completeness, acuracy, and adequacy of presentation. Finally, using standard flowcharting and numerical conventions, prepare an integrated description of the results of the entire analysis. Then go to STEP 12.

CHECKLIST

11. Has the entire analysis been completed, reviewed and described with flowcharts and numbering systems as appropriate?

    11.1 Are there any steps, factors, principles, or job aids which were marked for process analysis (STEP 3), factor-transfer analysis (STEP 6) or principle-transfer analysis (STEP 8) which have not yet been analyzed?

    11.2 Has at least one other source of information confirmed the accuracy and completeness of the analysis?

    Have any necessary changes or additions been made and reviewed?

    11.3 Does the integrated description contain all steps, factors, principles, job aids, and underlying knowledge?

    Do the standard conventions indicate all relationships among steps and substeps, factors and subfactors, and categories of principles?

    Do the standard conventions indicate all relationships among steps, factors, and

principles, and their underlying knowledge?

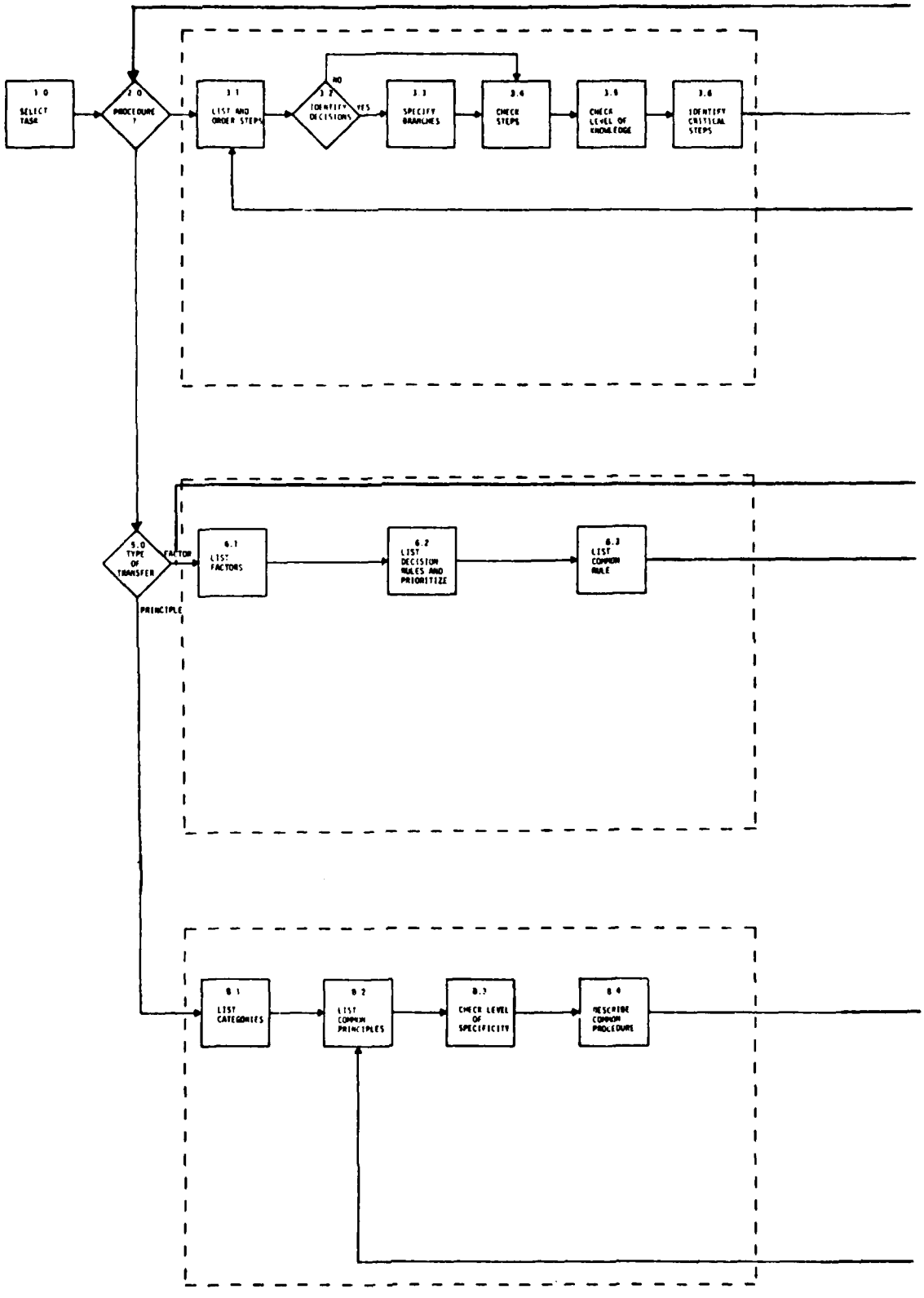
Are flowcharts used to describe all procedural activities?

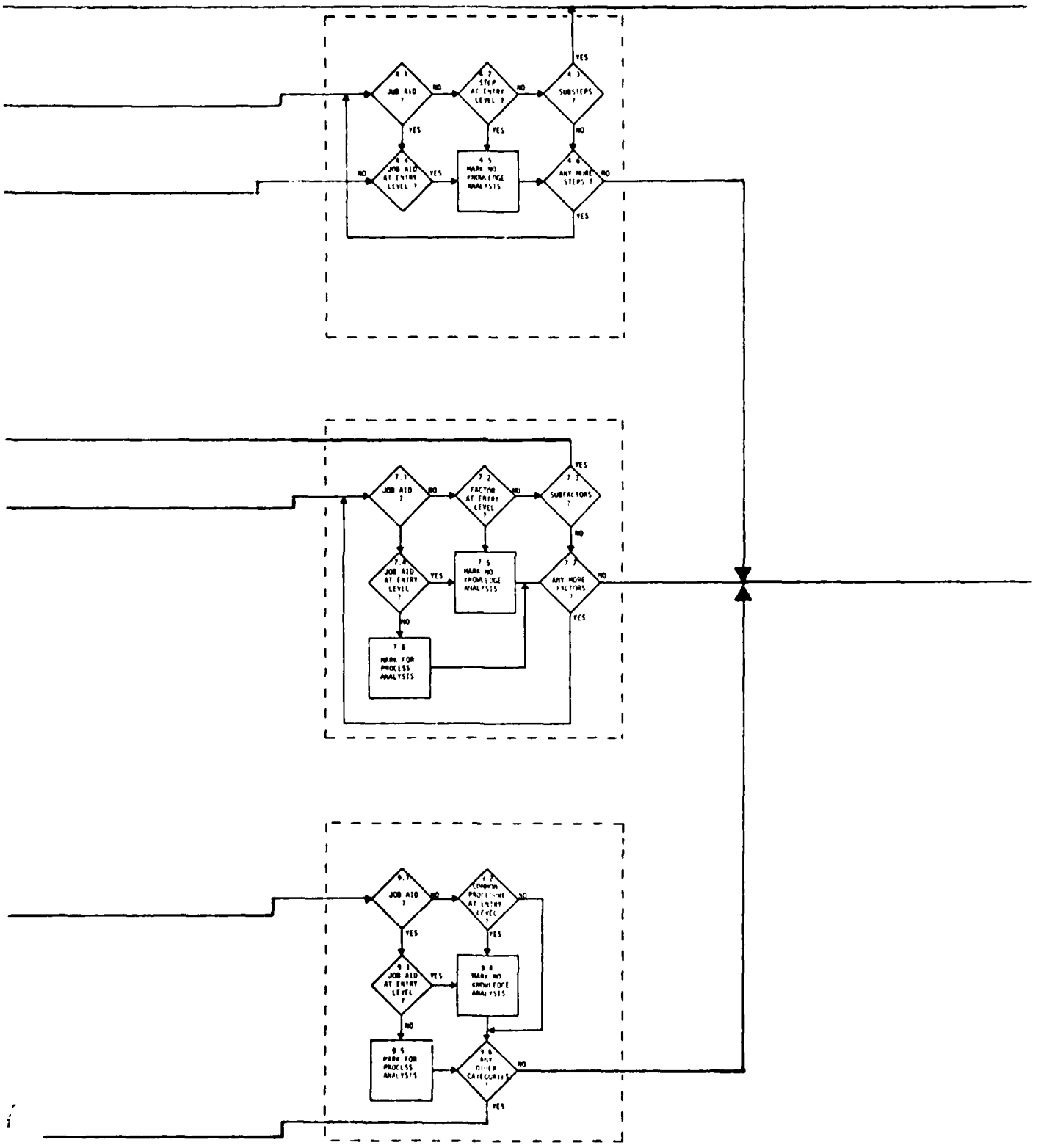
STEP 12 IDENTIFY BASIC SKILLS (more detail p.107).

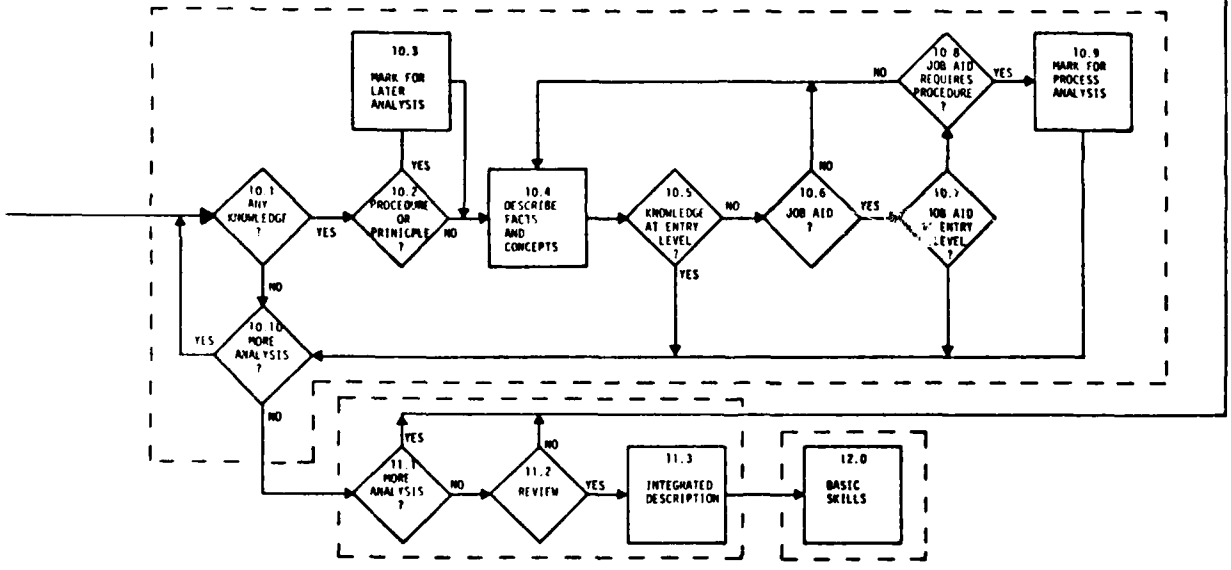
Have an experienced instructor review the results of STEP 11 and flag each step, factors, fact, concept, and principle that is taught in a training course. The remaining steps, facts, factor, concepts, and principles are basic skills which must be taught by BSEP.

CHECKLIST

12. Has an experienced instruction identified all skills and knowledge that must be taught by BSEP? Has this information been properly coded for use?


1.0
SELECT TASK
2.0
PROCEDURE ?
3.1
LIST AND ORDER STEPS
3.2
IDENTIFY DECISIONS
NO
YES
3.3
SPECIFY BRANCHES
3.4
CHECK STEPS
3.5
CHECK LEVEL OF KNOWLEDGE
3.6
IDENTIFY CRITICAL STEPS
5.0
TYPE OF TRANSFER
FACTOR
PRINCIPLE
6.1
LIST FACTORS
6.2
LIST DECISION RULES AND PRIORITIZE
6.3
LIST COMMON RULE
8.1
LIST CATEGORIES
8.2
LIST COMMON PRINCIPLES
8.3
CHECK LEVEL OF SPECIFICITY
8.4
DESCRIBE COMMON PROCEDURE


6.1 JOB AID ?
NO
6.2 STEP AT ENTRY LEVEL ?
NO
6.3 SUBSTEPS ?
YES
YES
NO
6.4 JOB AID AT ENTRY LEVEL ?
YES
NO
6.5 MARK NO KNOWLEDGE ANALYSIS
6.6 ANY MORE STEPS ?
NO
YES
7.1 JOB AID ?
NO
7.2 FACTOR AT ENTRY LEVEL ?
NO
7.3 SUBFACTORS ?
YES
NO
7.4 JOB AID AT ENTRY LEVEL ?
YES
NO
7.5 MARK NO KNOWLEDGE ANALYSIS
7.6 MARK FOR PROCESS ANALYSIS
7.7 ANY MORE FACTORS ?
NO
YES
9.1 JOB AID ?
NO
9.2 PROCESS AT ENTRY LEVEL ?
NO
YES
YES
9.3 JOB AID AT ENTRY LEVEL ?
YES
NO
9.4 MARK NO KNOWLEDGE ANALYSIS
9.5 MARK FOR PROCESS ANALYSIS
9.6 ANY OTHER CATEGORIES ?
NO
YES


10.3
MARK FOR LATER ANALYSIS
10.1 ANY KNOWLEDGE ?
YES
10.2 PROCEDURE OR PRINCIPLE ?
YES
NO
10.4 DESCRIBE FACTS AND CONCEPTS
10.5 KNOWLEDGE AT ENTRY LEVEL ?
NO
YES
10.6 JOB AID ?
NO
YES
10.7 JOB AID AT ENTRY LEVEL ?
10.8 JOB AID REQUIRES PROCEDURE ?
NO
YES
10.9 MARK FOR PROCESS ANALYSIS
NO
10.10 MORE ANALYSIS ?
YES
NO
11.1 MORE ANALYSIS ?
YES
NO
11.2 REVIEW
NO
YES
11.3 INTEGRATED DESCRIPTION
12.0 BASIC SKILLS

GUIDE FOR THE USE OF THE

EXTENDED TASK ANALYSIS PROCEDURE (ETAP)

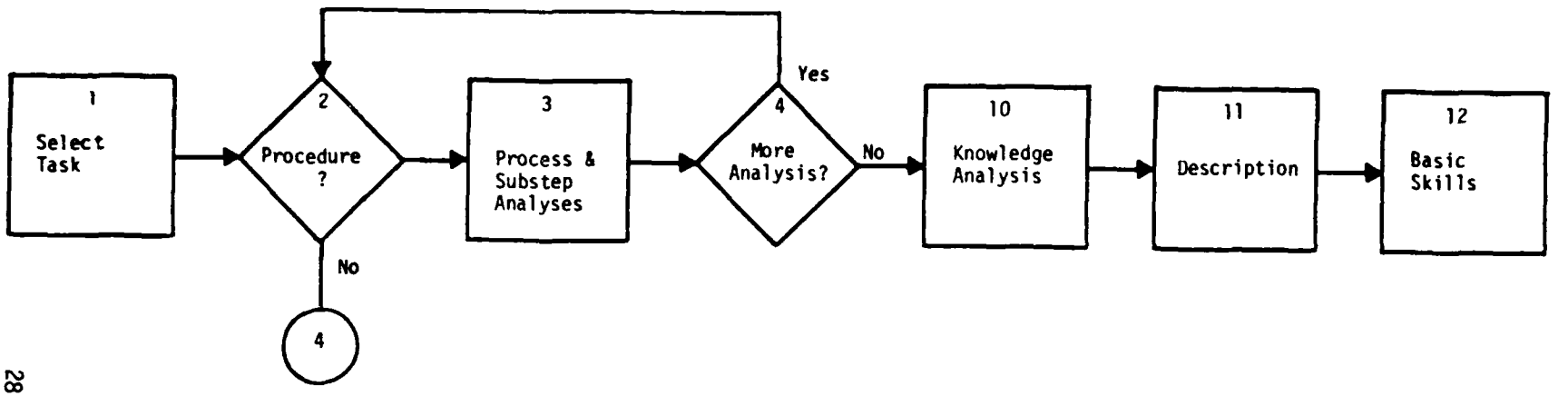
DETAILED DESCRIPTION

INDEX

SAMPLE PAGE FORMAT

Each section of the User's Manual consists of four parts: A FLOWCHART, a description of the STEPS involved; REMARKS about the analysis process; and an EXAMPLE illustrating the analysis process.

The flow chart appears on the left-hand page at the beginning of each section. The description of the steps appears on the right-hand page facing the flow chart. When necessary the description of the steps continues on the next left-hand page. The remarks follow the description of the steps and the example then follows the remarks to complete the section. Remarks are referenced back to the flowchart and the step descriptions by notes in the margin.



Procedural Analysis
Including: Process Analysis, Substep Analysis, and Knowledge Analysis
General Description

PROCEDURAL ANALYSIS

OVERVIEW

STEP 1 SELECT TASK.

STEP 2 IS TASK A PROCEDURE?

If it is procedural, go to STEP 3.

If not, go to STEP 5.

PROCEDURAL ANALYSIS

STEP 3 CONDUCT A PROCESS ANALYSIS.

Describe at the next more detailed level of description, the steps for doing a complete performance of the activity. Make sure they are in the correct procedural order. Identify all decisions and branches. Then go to step 4.

STEP 4 IS SUBSTEP ANALYSIS NECESSARY?

For each of the steps described in STEP 3 that are on too general a level of description for the lowest-ability entering soldier to be able to perform, go to STEP 2.

If no more steps, go to STEP 10.

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS.

For each step, identify and list all knowledge (i.e. all facts, concepts, and other information) that

must be learned before the step can be performed to criterion, and

have not been acquired by lowest-ability soldiers.

If you have finished analyzing all steps of this task, go to STEP 11.

STEP 11 DESCRIBE THE RESULTS OF THE ANALYSIS.

Review the analysis and complete all remaning examples. Using the standard numerical and flowcharting conventions, prepare an integrated description of the results of the analysis.

STEP 12 IDENTIFY BASIC SKILLS.

Have an experienced instructor review the results of STEP 11 and flag each step, fact, concept, and principle that is taught in a training course. The remaining steps, facts, concepts, and principles are basic skills which must be taught by BSEP.

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REFERENCE EXAMPLE

(We have selected the task "Conduct Inventories of Property Book Items," (No. 101-521-2153) to use for the procedural analysis process.

STEP 1 SELECT TASK.

Using soldiers manual, critical task lists, and the requirements of the particular school or training environment, select a task which needs to be analyzed for training. (see remarks)

REMARKS:

You may select the tasks in any order from the set of tasks assigned to you for analysis.

REFERENCE EXAMPLE

ANALYST: The task we'll be analyzing is task number 101-521-2153: Conduct Inventories of Property Book Items. Can this task be broken down into about 5 to 10 steps?

SME: Yes. You have to do several steps to perform the task.
(Analyst now proceeds to STEP 3.)

STEP 2 IS TASK A PROCEDURE?*

Ask the SME whether or not the task activity lends itself to being broken down into steps*. Ask the SME if the task consists of a fixed pattern of steps which are usually executed in the same sequence. If he indicates that there are a number of ways to perform the task, all of which are acceptable, then it may be procedural. (see REMARK 1) If he indicates that the soldier has to know how to adapt to the situation, then it may not be procedural (see REMARK 2).

If the activity does lend itself to being broken down into steps, then go to STEP 3.

If it does not, then go to STEP 5.

REMARKS

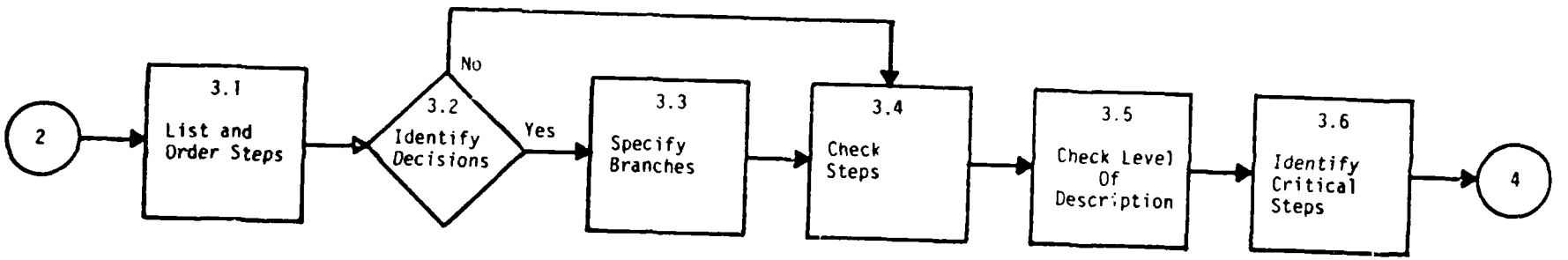
1. A useful rule of thumb is that an activity which requires a soldier to learn more than 7-10 procedures (or branches*) in order to perform that activity cannot conveniently be broken down into steps.

2. Consider whether the activity can be more efficiently learned by learning a single sequence of actions and decisions or by learning knowledge which underlies the activity. If efficient learning depends more heavily on underlying knowledge, then the activity cannot be conveniently broken down into steps.

REFERENCE EXAMPLE

(see facing page.)

*All asterisked (*) items are defined in the Glossary.



Step 3 Process Analysis
Detailed Flowchart

STEP 3 CONDUCT A PROCESS ANALYSIS*

Describe, at the next more detailed level of description*, the steps for doing a complete performance of the activity.

**3.1 Have the SME describe the activity at the next more detailed level of description* for performing the activity. Have the SME think of and list about 5 to 10 steps* for performing the activity and arrange them in the optimal procedural order*: (see REMARK 1). Then go to STEP 3.2.

3.2 Ask the SME to review the steps to determine if there are other ways the activity should be done, depending on conditions. (see REMARK 2)

If there are other ways, go to STEP 3.3.

If not, go to STEP 3.4.

**3.3 List the different ways the activity is done. Include these different ways as branches*, complete with related decision steps*. (see REMARK 3). Then go to STEP 3.4.

3.4 Ask the SME to check the steps* to ensure the presence of all decision steps*, execution steps*, and branches* that are appropriate for this level of description*, and to ensure that all steps are in the optimal procedural order*. Be careful to distinguish between parallel steps* and sequentially ordered steps*. (see REMARK 4). Then go to STEP 3.5.

3.5 Check to make sure that all steps are stated at approximately the same level of description and at an appropriate level of description. Then go to STEP 3.6.

3.6 Ask the SME to identify any critical steps* in the procedure and to include a step somewhere in the procedure for rechecking the critical step. (see REMARK 5). Then go to STEP 4.1.

For REMARKS see next page.

REMARKS

1. STEP 3.1 primarily entails breaking the action involved in the activity down into more precise, detailed, and/or specific actions and/or decisions. State each such action or decision in the form of a step, using action verbs.

Remember that you will be analyzing these steps in greater detail during a later STEP, so don't try to make them too detailed yet. If you have broken the activity down into more than about 10 fairly simply-worded steps, then it is probably too detailed.

2. STEP 3.2 involves the identification of other ways of performing the activity that are normally employed under different conditions. Be careful not to describe performances that represent personal preferences of the SME. Identify only approved "Army ways".

3. During STEP 3.3, be sure to include a decision point each time a soldier must consider existing conditions in selecting which way a given activity should be done. Make certain that at least two branches result from each decision point.

4. If it makes absolutely no difference what order two steps are performed, then the "optimal procedural order" would show them as parallel steps rather than as sequentially prerequisite steps.

5. A step can be considered critical if an error in performing it may result in large expenditures of time, money, and/or manpower. Be sure to include a step in the procedure to check the outcome of critical steps.

REFERENCE EXAMPLE

ANALYST: What are the 5 or 10 major steps the soldier has to do? Please describe them.

SME: Look at the Soldier's Manual. It's all laid out there -- all of the steps. That's the procedure.

ANALYST: Remember that the Soldier's Manual is really designed to identify performance measures for the task. Those measures may not actually correspond to the steps a soldier must perform. Does the manual list all the steps you think are important? Does it include any steps you don't believe are necessary? How would you describe the task?

SME: The steps in the manual are accurate, but they don't really describe how you do an inventory. Also there are different kinds of inventories.

ANALYST: Tell me about the different kinds.

SME: Uh - you can do a total inventory - everything in stores - or you can just inventory sensitive items, weapons, and ammunition. Also you can conduct the inventory by serial numbers, or by lot numbers, or Julian Dates.

ANALYST: What do you mean?

SME: There are different reasons for doing an inventory and different ways of doing it. Different kinds of stores are counted by different methods.

ANALYST: What are the different reasons for an inventory?

SME: Regulations list a set of questions you have to answer to determine the reason for the inventory. For example, one question asks if there's been a total inventory in the past year. If there hasn't been, you must do a total inventory. If there has been, you may still need some other kind of inventory. The reasons are

1) a year's elapsed time
2) change of command
3) transfer of the arms room key, and
4) 30 days have elapsed since the last inventory of sensitive items.

If any of these conditions exist, some kind of inventory is needed.

ANALYST: Is there a different procedure to be followed for different conditions, or are you just identifying different reasons for following a single procedure?

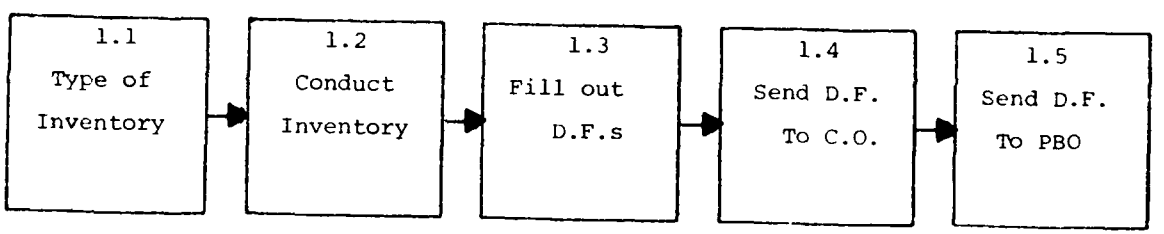
SME: The procedure could be different. It depends on the kind of inventory needed and the kinds of items that have to be counted.

REFERENCE EXAMPLE (con't)

ANALYST: Let me recap what you've said. The first thing you do is determine whether an inventory is needed and what kind of inventory. Is that an accurate statement?
SME: Yes. That's the first step.
ANALYST: OK. What does the soldier do next--after he's decided on the type of inventory.
SME: He does the inventory.
ANALYST: What does that mean?
SME: He has to match what's on the shelves to what's listed in the property book--match what he's got with what he's supposed to have--to see if there are any discrepancies.
ANALYST: Good--that's a very clear description. What's the next step.
SME: He fills out the Disposition Forms. Then he sends them to the C.O. for approval. Finally, he sends the approved forms to the PBO for posting. That's the whole procedure.
ANALYST: OK. Let's see if I understand. First, you determine what kind of inventory is needed. Then you match the property book to the shelves to identify any discrepancies. Third, you fill out the Disposition Forms. Fourth, send the forms to the C.O. for approval. Fifth, you send the approved forms to the PBO for posting. I've drawn a flow diagram of the steps as I understand them. Does it represent what you've said accurately and completely? (Analyst shows the SME Figure 1).
SME: Yes--that's the way it's done.
ANALYST: Now, are there any other ways to do the task or is this the only way?
SME: No--those five steps, in that order. That's it.

(Analyst skips STEP 3.3 by going directly to STEP 3.4 from STEP 3.2. If other ways existed, each would be analyzed and described in the same way)

Figure 1: Basic Procedure for Task



REFERENCE EXAMPLE (con't)

ANALYST: Can you think of any steps or decisions that may have been left out?

SME: No.

ANALYST: Is it best to perform the five steps in the sequence described, or is it just as good to do some steps in a different order?

SME: They have to be done in that order.

ANALYST: Can any of the steps be omitted sometimes?

SME: No.

ANALYST: Have we described them with the same amount of detail, or are some at a more general level than others?

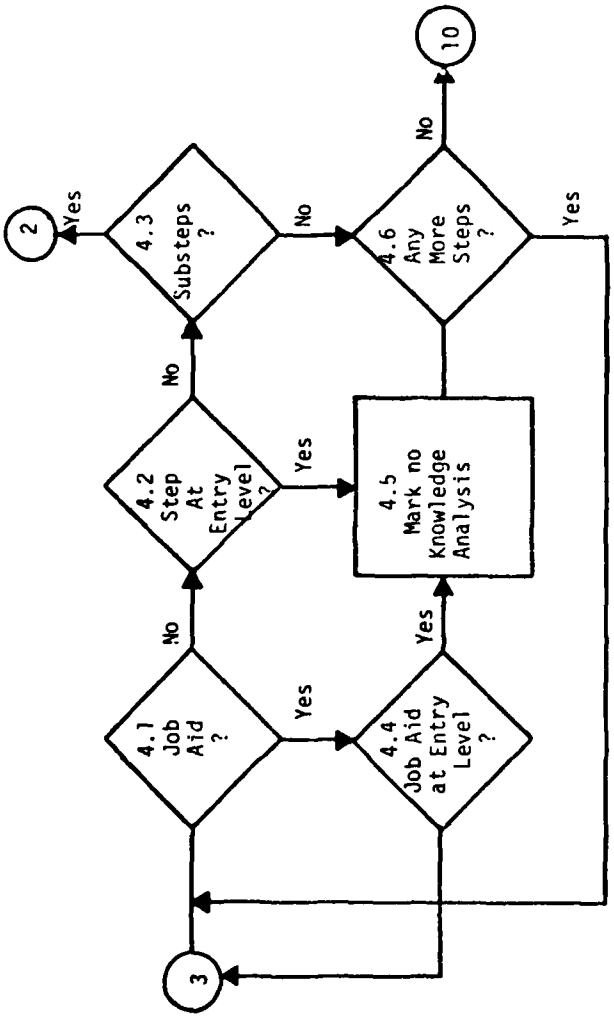
SME: No, they're all pretty general.

ANALYST: Good. Now, is any one of the steps particularly critical? Would an error there have especially severe consequences?

SME: I can't single out any one step; they're all very important at this level of description.

ANALYST: Fine.

(Analyst goes on to STEP 4 now).



SUBSTEP ANALYSIS
DETAILED FLOWCHART

STEP 4 CONDUCT SUBSTEP ANALYSIS

For each step listed in STEP 3, decide whether the action is on too general a level of description for the lowest-ability entering soldier to be able to perform that step.

4.1 Choose one of the steps identified in STEP 3. Does a job aid exist for the action identified by the step? (see REMARK 3).

If yes, go to STEP 4.4 to analyze the job aid.

If no, go to STEP 4.2.

4.2 Can a soldier at entry level perform the action involved in the step without further training?

If yes, go to STEP 4.5.

If no, go to STEP 4.3.

4.3 Can the action identified in the step be further broken down into substeps? (see REMARK 1 and 2)

If yes, go to STEP 2 (If STEP 2 indicates the step being analyzed is a procedural activity, then proess analysis is continued in STEP 3.)

If no, go to STEP 4.6.

4.4 Can a soldier at entry level use the job aid without further training?

If yes, go to STEP 4.5.

If no, go to STEP 3 to conduct process analysis on the job aid.

4.5 Mark the step or job aid to indicate that no knowledge analysis is required. Then go to STEP 4.6.

4.6 Are there any more steps which have not been submitted to substep analysis? Have all the substeps identified as a result of substep analysis been submitted to further substep analysis until all of the substeps are at a level appropriate to th lowest-ability entering soldier?

If yes, go to STEP 4.1 to analyze the next step.

If no, go to STEP 10.

REMARKS:

1. A step is on too general a level of description if it does not describe sufficiently precise and detailed actions for the lowest-ability entering soldier to be able to perform the step.

2. If the activity is described at a level below that at which training begins, you may wish to consult a basic skills expert in addition to your SME.

3. When a job aid exists for a step in a procedure, it is not necessary to reanalyze all of the steps which the job aid enables the soldier to do. However, the job aid itself may require the soldier to learn a procedure for using the job aid. The process analysis in this case should concentrate on identifying this procedure for using the job aid.

4. Complete the SUBSTEP analysis for all steps which are too general before continuing to STEP 10.

5. The substeps for a step which appears linear at one level of analysis may require a decision and branches when specified at a greater level of detail. Be sure to specify all of these decisions and branches. It may be easier to follow one branch at a time and then return to do other branches.

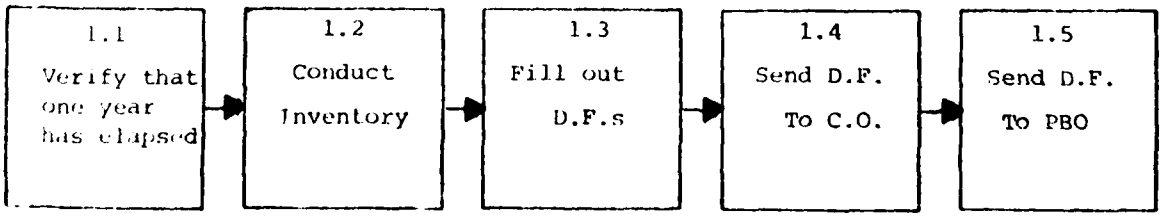
REFERENCE EXAMPLE

ANALYST: Let's look at the first step, determining the type of inventory. Is there a job aid a soldier can use to help him perform this step?
SME: Not really, the soldier has to know the substeps.
ANALYST: The step is described in fairly general terms. Is it sufficiently detailed and precise for any entering soldier to be able to perform the task?
SME: No way - its much too general.
ANALYST: Fine. Then we need to break this step down into a set of more detailed and specific steps. How does a soldier determine the kind of inventory needed? Does he follow a set of steps?
SME: I've already mentioned the set of questions he has to answer. The answers lead him to select a particular kind of inventory - by process of elimination.
ANALYST: You're saying that the soldier makes a series of decisions?
SME: Right. For any question, the answer can either lead him to a particular kind of inventory or to another question. The decisions help him to select the appropriate procedure.
ANALYST: What comes first?
SME: First you determine if a year has elapsed since the last total inventory. If it has, you have to do a total inventory. That finishes step 1 right there because you know you have to do the inventory. So you go to step 2 and do it.
ANALYST: Good. If you know that the inventory is needed at that point, you don't ask any more questions. That's the quickest route through step one - only a single decision.

(The analysis focuses first on the shortest path in the procedure, by reducing the step to a single decision.)

So a diagram of the procedure under this condition would look like this (Figure 2)? Is it correct?

Figure 2: Step 1: Shortest Path in Full Procedure



REFERENCE EXAMPLE (con't)

SME: Yes. It's very short.

ANALYST: What you've said is that the simplest or shortest way of performing the first step is to determine that a year has elapsed since the last total inventory. That sends the soldier right to step 2, performing the inventory. But what if the answer is no, it hasn't been a year? What else happens in step 1?

SME: Well, then you ask another question: has there been a change of command since the last total inventory? If there has been, you have to do the total inventory. So even with making the second decision, you then go right to step 2 and do the total inventory.

ANALYST: OK. We've identified two decisions that may have to be made. What if there hasn't been a change of command? What does the soldier do if the answer is no?

SME: You've got another decison. If the answer is yes, do a total inventory; but if it's no, answer another question.

ANALYST: For each decision, we have a short route that leads to an inventory and a longer route that leads to another decision. What is the next decision?

SME: You decide whether or not there has been an inventory of sensitive items, weapons, and ammunition during the past 30 days. If not, you have to inventory those things. That's your short branch, I guess. And if there has been, you go to the next question--that'll be the longest path through the step because it includes all the decisions possible in this step.

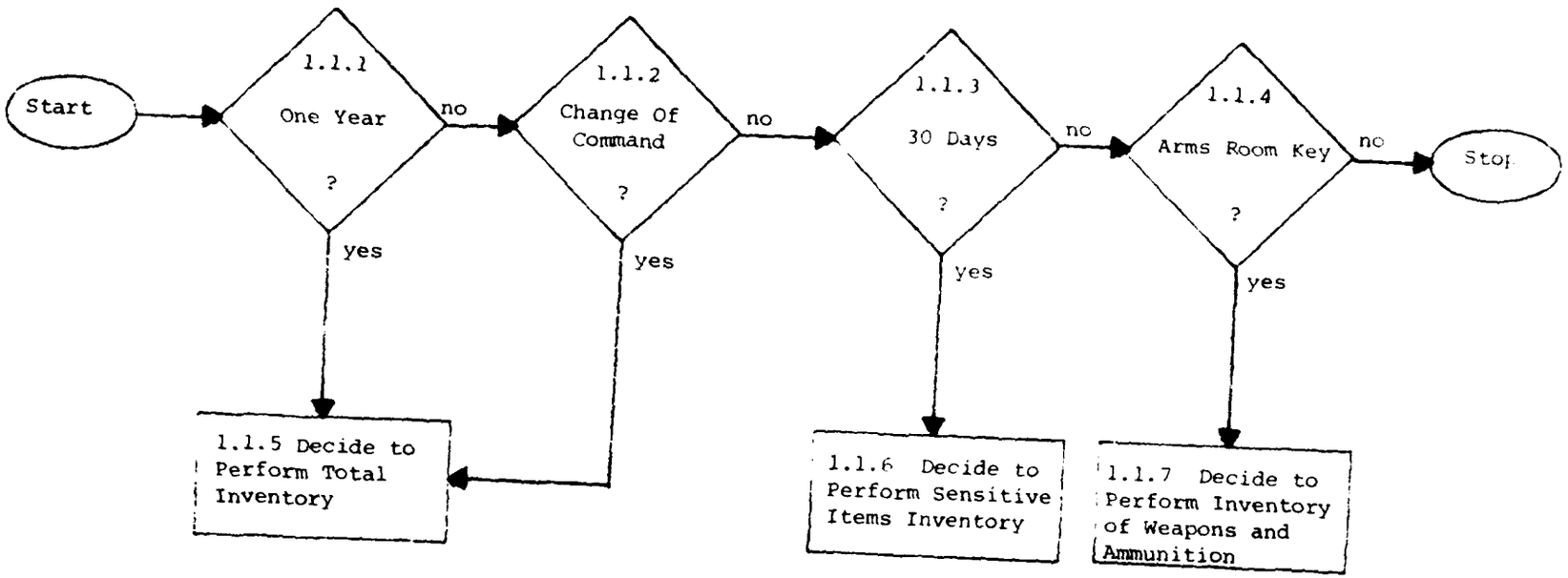
ANALYST: Great. What's the last decision?

SME: You decide whether or not the key to the arms room has been transfered since the last inventory. If it has not been, you stop right there because there's no reason to do an inventory. You've eliminated all the reasons. But if it's yes, you have to inventory the weapons and ammunition. So you go to step 2 to do it.

ANALYST: Great. I've made a diagram of these decisions. Does it look complete and accurate (Figure 3)?

SME: Yes--that's exactly what happens. It's OK.

Figure 3: STEPS COMPRISING STEP 1 (LONGEST PATH)



REFERENCE EXAMPLE (con't)

ANALYST: Now, these steps are parts of step one. What about step 2, conducting the inventory. What do you have to do? Suppose you decide that a total inventory was needed because a year had elapsed since the last one? Describe how that inventory would be conducted, please.

SME: There are two steps. First, the soldier must actually list all the items that should be there. Also he has to decide on the counting method. Sometimes individual items are counted one at a time. And sometimes, lots are counted; it depends on the type of item.

ANALYST: How does the soldier make that decision? Does he have a job aid to help him?

SME: The regulations tell him. He looks it up in his manual. That's a job aid, I guess.

ANALYST: What I understand is that two steps are involved here: making the actual lists and selecting the required counting methods. OK. Is that all?

SME: Yes, two steps. Verifying the list is more involved.

ANALYST: The regulations on counting methods are in a manual?

SME: Yes.

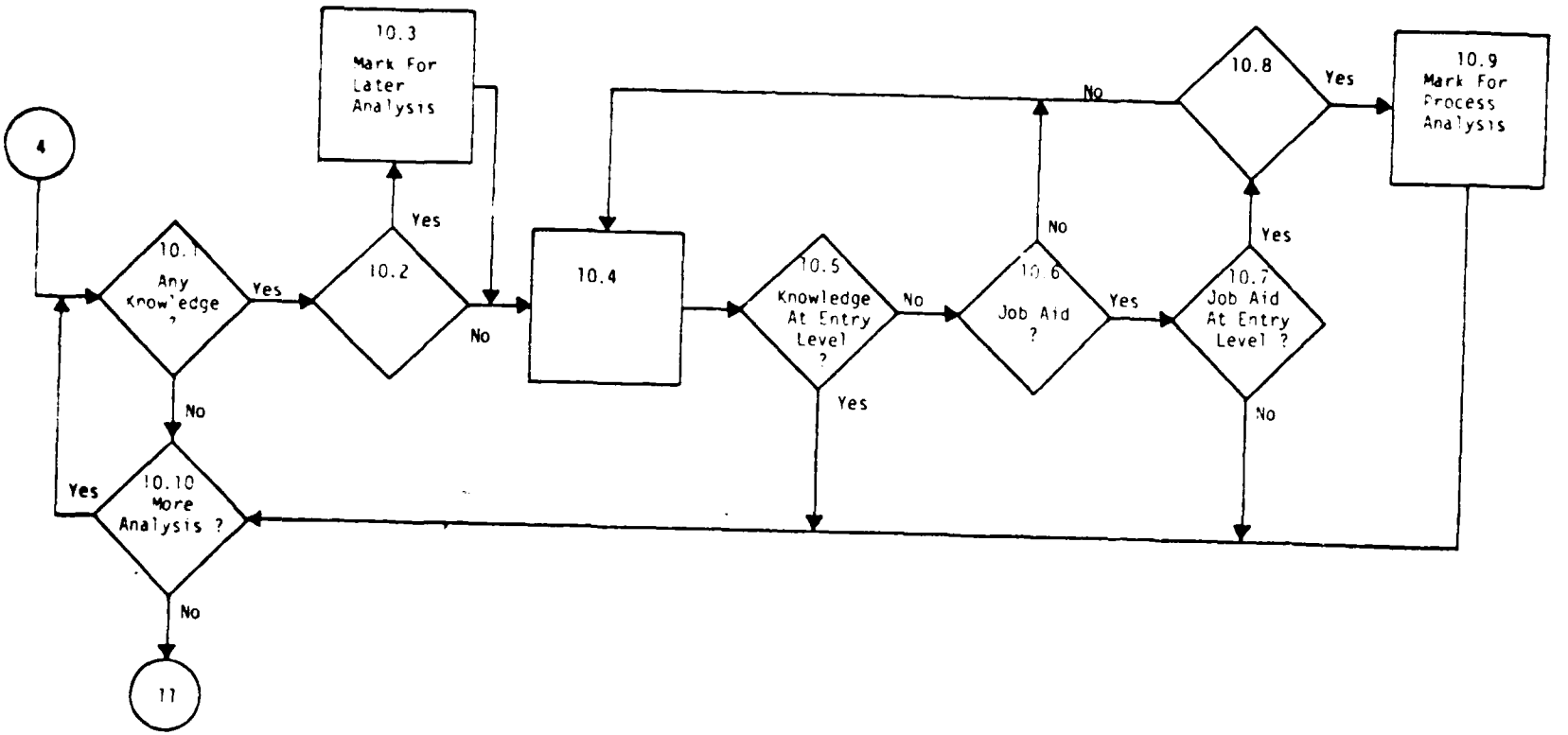
ANALYST: So the soldier only needs to look up the correct counting method when he needs it. He doesn't need to already know it.

SME: Right.

ANALYST: Can an entering soldier use the manual? Or would he need more instruction?

SME: He would need instruction in using the regulation manual.

ANALYST: OK. Then let's flag this substep on counting methods and continue our breakdown of STEP 2. Then we'll return to analyze the procedure for using the regulation manual. Now, is there another step to be analyzed?



Knowledge Analysis

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS

Examine each step at its lowest level of description to determine whether or not there is any knowledge (facts or concepts) that

- must be learned before the step can be performed to criterion, and
- have not been acquired by soldiers who are at the minimum acceptance level.

10.1 Examine each procedural step at its lowest level of description and each job aid (except those marked no knowledge analysis required). Is there any knowledge (facts or concepts) that must be used to perform the step to criterion? (see REMARK 1)

If there is, go to STEP 10.4

If there is not, go to STEP 10.10

10.2 (See REMARK 7.)

10.3 If a procedure is required, mark to indicate that process analysis (STEP 3) is required for the factor. Go to STEP 10.4.

10.4 Identify and describe with a label and/or a definition each concept or fact which is prerequisite to the performance of the activity identified for the step or substep. Determine whether the knowledge is a fact or concept and label using the standard conventions. (see REMARKS 4, 5, and 6)

10.5 Has the required knowledge already been acquired by the lowest-ability entering soldier?

If the knowledge has already been acquired, go to STEP 10.10.

If the knowledge has not already been acquired go to STEP 10.6.

10.6 Is there a job aid which provides the knowledge required for the step or subject? (see REMARK 2)

If not, go to STEP 10.4 to analyze the knowledge further.

If there is a job aid, go to STEP 10.7.

10.7 Does the lowest-ability entering soldier need additional training to use the job aid? (see REMARK 3)

If yes go to STEP 10.8.

If no go to STEP 10.10.

10.8 Does the job aid require the soldier to learn a procedure for its use? Does the job aid require the soldier to know some other knowledge (facts or concepts)?

If a procedure is required, go to STEP 10.9.

If concepts or facts are required, go to STEP 10.4 to identify the prerequisite facts or concepts.

10.9 Mark the job aid to indicate that process analysis (STEP 3) is required. then go to STEP 10.10.

10.10 Are there any more steps which have not been submitted to knowledge analysis? Have all of the concepts which we identified as a result of the knowledge analysis been submitted to further analysis until the component concepts are all those which can be assumed to have been acquired by the entering soldier at the minimum acceptance level?

If all steps and knowledge are at the minimum acceptance level, go to STEP 11.1.

If more analysis is needed, go to STEP 10.1.

REMARKS:

1. Consider each procedural step separately in performing STEP 10.1.

2. A job aid is any source of information that a soldier can consult rather than learn the information him/herself. Some representative types of job aids are manuals, directives, maps, charts, graphs, and tables.

3. In performing STEP 10.4, list all knowledge a soldier must possess before he or she is able to use the job aid. Such knowledge may include common knowledge (knowledge common to the use of all job aids) and specific knowledge (knowledge that is specific to the use of this particular job aid). Analyze each job aid and each piece of required knowledge separately.

4. In performing STEP 10.5, you may wish to consult a Basic Skills Expert as well as the SME in determining the minimum acceptance level of knowledge.

5. Standard conventions are the numerical and flowcharting systems used to identify individual steps, pieces, of knowledge, and relationships. For further information on the conventions, consult the appropriate section of this manual.

6. You should usually carry out the conceptual analysis down to a lower level of knowledge than you believe necessary. SMEs tend to overrate the minimum level of conceptual knowledge that may require teaching. By carrying the analysis a level or two below the anticipated level, you will allow for variations in soldier knowledge and in needed instruction.

7. This step is not included here because it is not necessary for the knowledge analysis of procedures.

REFERENCE EXAMPLE

ANALYST: Fine. Now we've broken down the task into steps whose actions are described in enough detail for a soldier at the minimum acceptance level of skills and knowledge to be able to perform the task. What we must do now is identify the knowledge that a soldier must use in order to perform each step. I'm particularly interested in identifying knowledge that soldiers at the minimum acceptance level don't have. Let's look at each of the steps individually. In deciding whether or not an inventory is necessary, what concepts or facts must a soldier know before he can learn how to make that decision?

SME: He must know what an inventory is, what the sensitive items are, and what the regulations are that govern inventories.

ANALYST: Would any entering soldier already know these? Or would he have to learn them?

SME: He probably might know what an inventory is but, not how to do one. And he wouldn't know what the specific regulations are.

ANALYST: Is there anything like a manual or any person who can give this information to the soldier everytime he needs it, or must the soldier learn it?

SME: He has to know what an inventory is and what is meant by "sensitive items." But he can consult regulations to find out what the sensitive items are and what the regulations are.

ANALYST: What must the soldier know in order to use the regulations?

SME: He just has to be able to read; there's no special knowledge.

ANALYST: OK, knowing what an inventory is involves knowing the concept "inventory." Is any other knowledge needed for these steps--deciding whether to perform an inventory.

SME: No. That's it.

ANALYST: What about the next step--making the lists?

SME: No special knowledge for just creating lists. But the soldier must know what the counting methods are and how to choose one. That's in regulations; he can consult a manual.

ANALYST: Fine. He can use a job aid, the manual. What about the next step ...

(the process is continued until all prerequisite knowledge has been identified for each step of the task at its lowest level of description).

REFERENCE EXAMPLE

ANALYST: OK, we've said that one concept is "counting methods." Are there any concepts the soldier has to know before he can learn what that concept is?

SME: Yes. He has to know what serial numbers are, what lot numbers are, and what Julian Calendar dates are.

ANALYST: Are you saying that he has to know specific serial numbers?

SME: No. He has to understand what a serial number is and how it can be used. The same goes for lot numbers and Julian Calendar dates. I guess those are concepts too.

ANALYST: You're saying that the soldier has to learn these three concepts before he can learn the concept "identifying number." OK, are there any other things the soldier must know before he can learn about identifying numbers?

SME: Yes. He has to know what kinds of items take each kind of number. Like weapons have serial numbers, but shirts take lot numbers.

ANALYST: OK. Those are facts he must learn. Are there any procedures involved in using any job aids?

SME: Yes. The soldier has to learn to use the Julian Calendar job aid. These are the steps he must follow ...

ANALYST: OK. What about the basic skills and knowledge the soldier needs in order to be able to learn these concepts and the procedure?

SME: It's very important for him to be able to recognize numbers and letters so that he can match long strings of them. All identifying numbers are fairly long and have to be matched exactly.

ANALYST: You're saying that the prerequisite skills for learning the concept "identifying number" are skills in recognizing and matching alphanumeric characters?

SME: Yes. Those skills have to be acquired first.

ANALYST: Here's a diagram of our discussions about the knowledge a soldier needs in order to be able to match identifying numbers on the list with the numbers on the items.

(Figure 4: part of the entire conceptual analysis). Would you check it over?

SME: Yeah - that's right. Even to the really basic stuff anyone ought to know - recognizing different kinds of numbers. That's a very basic level.

ANALYST: It's important that we identify all the skills and knowledge a soldier needs to learn this task. The most basic elements probably will not be taught in a training program, but they may need to be taught in BSEP. So we must identify them. I've made a flow diagram of the steps we've analyzed. Does it represent the procedure accurately? (Figure 5).

SME: Yes--that looks good.

ANALYST: Fine. We have a check built right in to recount any types of items for which there are discrepancies. That's important. Now, let's look at the steps. Are they described in enough detail for a soldier at the minimum acceptance level to be able to follow them?

SME: Some of them need to be broken down. Like "verifying the lists" ... (the process continues).

ANALYST: Fine. Here's a diagram of the step you've described for verifying the lists. Would you check it over? (the analyst continues by breaking down each step until the task is described at a level of detail and specificity useful for a soldier at the minimum acceptance level. Usually, the analyst goes further in the process than the SME thinks necessary to ensure an appropriate and useful level of description).

STEP 1.2.2 Select counting method for each type of item.

1.2.2.1c identifying number
1.2.2.1c.1c serial number
1.2.2.1c.2c lot number
1.2.2.1c.3c Julian dates
1.2.2.1c.3c.1 procedure for finding Julian dates--job aid: Julian Calendar
1.2.2.1c.3c.1c alphanumeric characters
1.2.2.1c.1c.1c alphanumeric characters (same as 1.1.2.1c.3c.1.1c)
1.2.2.1c.2c.1c alphanumeric characters (same as 1.1.2.1c.3c.1.1c)

1.2.2.2c counting methods
1.2.2.3 procedures for selecting courting method--job aid: technical manual
1.2.2.4 skill in recognizing and distinguighing among alphanumeric characters
1.2.2.5 skill in matching groups of 4+ alphanumeric characters

Figure 4: Conceptual Analysis of STEP 1.2.2

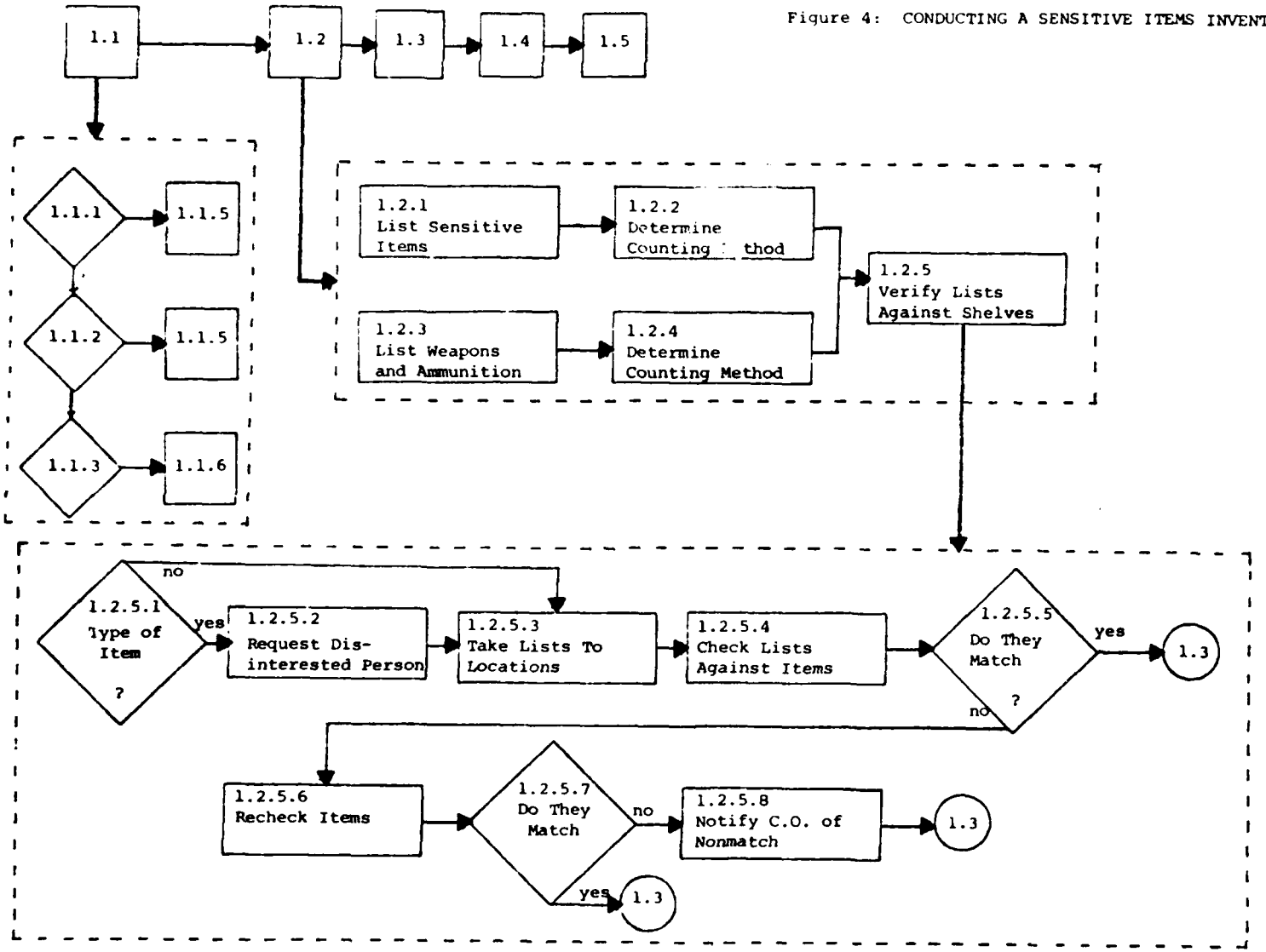


Figure 4: CONDUCTING A SENSITIVE ITEMS INVENTORY

Factor - Transfer Analysis

FACTOR-TRANSFER ANALYSIS

OVERVIEW

STEP 1 SELECT TASK

STEP 2 IS TASK A PROCEDURE?

If it is procedural, go to STEP 3.

If not, go to STEP 5.

TYPE OF TRANSFER ANALYSIS

STEP 5 IS TASK FACTOR-TRANSFER OR PRINCIPLE TRANSFER?

If it is factor-transfer, go to STEP 6.

If it is principle-transfer, go to STEP 8.

FACTOR-TRANSFER ANALYSIS

STEP 6 CONDUCT A FACTOR-TRANSFER ANALYSIS.

Identify and list: all of the factors that may need to be considered in order to perform the activity well, the decision rule(s) for each factor, all their common rules for deciding which factors should be considered when, combining all relevant factors in making the decision.

STEP 7 IS SUBFACTOR ANALYSIS NECESSARY?

Identify all factors listed in STEP 6 that themselves need to be broken down into factors, and repeat STEPS 6 and 7 for each.

STEP 10. CONDUCT A KNOWLEDGE ANALYSIS.

For each factor and rule, identify and list all knowledge (all facts, concepts, and principles) that

--must be learned before the rule can be used effectively in making the decision, and

--has not been acquired by soldiers who are at the minimum acceptance level.

If there are more steps to analyze, go to STEP 5.

If you have finished analyzing all steps of this task, go to STEP 11.

PREPARE FINAL REPORT

11. DESCRIBE THE RESULTS OF THE ANALYSIS.

Review the entire analysis. Complete all remaining analysis. Using the standard numerical and diagramatic conventions, prepare an integrated description of the results of the analysis.

12. IDENTIFY BASIC SKILLS.

Have an experienced instructor review the results of STEP 12 and flag each step, fact, concept, and principle that is taught in a training course. The remaining steps, facts, concepts, and principles are basic skills which must be taught by BSEP. Mark these using the standard conventions; then go to STEP 7 to analyze it as a factor-transfer activity.

REFERENCE EXAMPLE 1

We will now switch to task 867-793-2101 for our reference example: ESTABLISH A COMSEC MONITOR SITE (skill Level 2). Earlier in the process of analyzing this task one of the steps--step 3--was identfied as nonprocedural. The analysis of that step is described below.

ANALYST: You mentioned that to do step 3, a soldier has to know which conditons or factors to consider. Is it sufficient for a soldier to know these factors to perform the task, or are there some other things like principles that are important for deciding how to perform the activity?

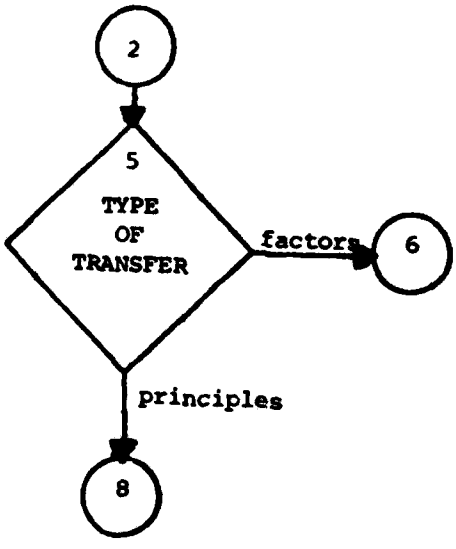
SME: Knowing the factors is enough.

REFERENCE EXAMPLE 2

Another activity that is used as a reference example for STEPS 8 and 10 is No. 867-793-3301, Draft a SIGINT Threat Briefing. The first level of analysis revealed six steps which are performed in order (making it a unitary procedural activity at that level of description). One of those six steps, identifying the type of briefing needed, is analyzed in the following example.

ANALYST: Let's look at the activity you described as identifying the type of briefing needed. How are important decisions made for this activity? Do you think about different factors that must be considered? Or are there principles that you use in making decisions?

SME: There are principles that guide me. I have to understand how certain things influence other things. The principles help me to decide what to do.


2
5
TYPE
OF
TRANSFER
factors
6
principles
8

STEP 5 DETERMINE TYPE OF TRANSFER ANALYSIS

STEP 5 Ask the SME whether or not it is sufficient for a soldier to know factors that should be considered in performing the activity, or whether it is more important for a soldier to know principles that can be used to decide how to perform the activity. (see REMARKS)

If it is sufficient for a soldier to know factors that should be considered in performing the activity, then go to STEP 6 to analyze it as a factor-transfer activity.

If it is more important for a soldier to know principles, then go to STEP 8 to analyze it as a principle-transfer activity.

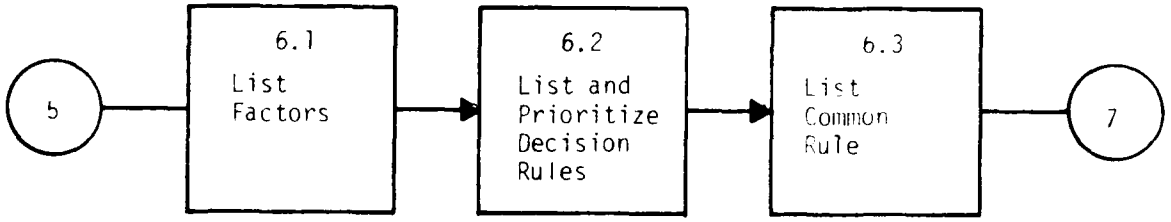
REMARKS

1. Remember that a factor is similar to a condition. The major difference is that a factor is a certain kind of condition--one that changes the way the task should be performed.

2. All procedural and factor-transfer activities must be analyzed before you begin to analyze any principle-transfer activities.

REFERENCE EXAMPLE

See facing page.



Analysis Of Factors

STEP 6. CONDUCT AN ANALYSIS OF FACTORS*

STEP 6.1 Help the SME to identify and list all of the factors* that may need to be considered in order to perform the activity well. (see REMARK 1)

STEP **6.2 Help the SME to identify, list, and prioritize the decision rules* (either principles* or procedures*) for each factor. (see REMARK 2)

STEP **6.3 Have the SME think through several performances of the step to try to identify any common rules* (procedures* or principles*) that relate to (1) deciding which factors should be considered when and (2) which factors should take priority if two or more factors are in conflict. (see REMARK 3)

REMARKS

1. Have the SME identify all conditions which must be considered in making the decision, together with all the different values each factor might take. Review the list with the SME to identify the complete set of generally stated factors which include all more specific ones and which are at the same level of description.

2. For each factor, a decision rule should be identified which state how the factor should be considered in making the decision. In addition, any decision rules which are common to two or more factors should be identified. The decision rules should be arranged in order of priority or importance.

3. During STEP 6.3, you should be aware of the amount of time involved in the SME's relating and examining various performances of the step as examples. Be careful to avoid spending too much time in relating "war stories", rather than in extracting the common decision rules. It may be helpful to direct the SME to consider only those applications of the step which represent frequently appearing situations.

REFERENCE EXAMPLE

ANALYST: Let's analyze step 3 of this task "determine the location for the power source." How would you identify all the conditions which must be taken into account here? In other words, what are the things that you should consider in deciding where to put the power source?

SME: First, you must think of what kinds of power sources you've got. Is it the commercial type or are you bringing your own generator? If you're bringing your own generator, you have to think about:

- how much fuel you have,
- how and where you're going to store it,
- how accessible both the generator and the fuel are,
- what are the limitations of the equipment you're using, like how much cable you have to work with, how much space the equipment will take,
- what the terrain is like and how the terrain restricts where you can put things,
- the type of unit you're monitoring,
- security and concealment requirements,
- noise discipline, for example keep the generator away from sleeping areas if you can.

ANALYST: OK, you've given me all these examples. In all these examples, are there some common concerns or conditions that should be considered every time the power source location is to be determined?

(Here, the analyst is trying to extract all the important factors to be considered in making a necessary decision in performing the task, together with all the different values each factor might take.)

SME: Well, like I told you, something you consider first is how much fuel you have and how and where you're going to store it.

ANALYST: OK, it seems you're saying fuel requirements is one important consideration. So can we then say "fuel storage requirements" is one of the important factors to be considered?

SME: Yep!

(Analyst does it for all the examples SME described. Analyst summarizes everything s/he's heard in general terms for SME's approval, always guiding SME to the approporate level of description).

REFERENCE EXAMPLE (con't)

ANALYST: So, it is accurate to conclude that all the important factors for this step of the task are the following:

a) type of power source
b) equipment limitations
c) accessibility
d) fuel storage requirements
e) noise discipline
f) enemy/friendly fire
g) concealment requirements
h) terrain restrictions
i) tactical vs. garrison
j) offensive vs. defensive

SME: Yes, it's accurate.

ANALYST: How do you use the limitations of the equipment to decide on the location of the power source?

(The factor "equipment limitations" is chosen for our purposes as the reference example. But the analyst should go through the same process for all factors).

SME: Well, if you're tapping into a commercial source, you can only use as much cable as you have. If you're using a generator, there's a bunch of stuff you have to consider:

1) the most important is that the generator has to be level and
2) it has to be close enough to the fuel storage to obtain fuel easily. After that
3) you should consider cable length that connects the generator to the equipment. And the last rule is
4) locate the generator for the least amount of noise in the living areas where the tents are; but this can be ignored if necessary, if problems arise.

ANALYST: Are these all for this factor?

SME: Yes.

ANALYST: Which is the order that the factors should be considered?

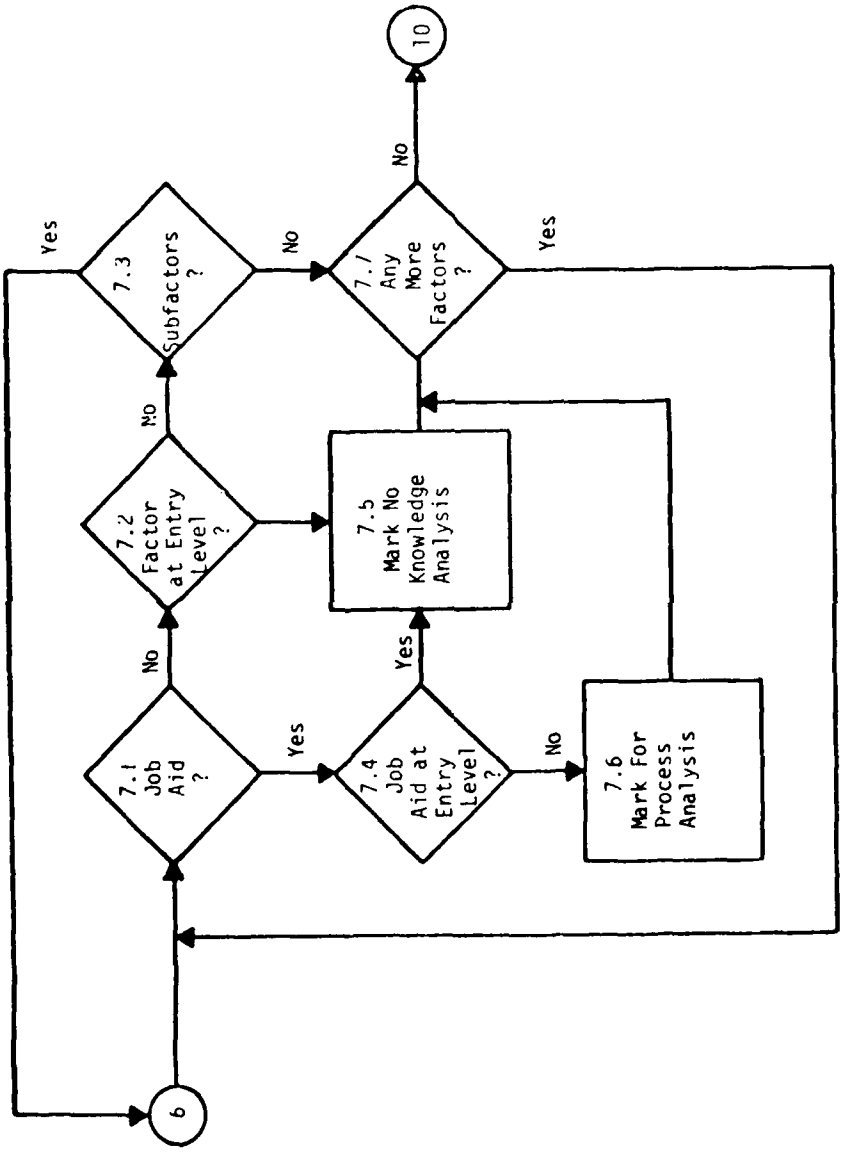
SME: Cable length is first, then fuel storage requirements, then accessability and finally noise discipline.

ANALYST: OK. So after giving me the examples, how do you use the factors to make the decision?

SME: First decide on the smallest possible amount of cable, determined by regulation. Again the manual tells how far the generator must be from storage area so this is the fuel storage requirement. You should then consider putting things close enough for accessability, again determined by regulation; and finally know that noise discipline can be sacrificed first.

ANALYST: Can you think of any other rules for using the factors in making a decision?

SME: No. That does it.


10
No
7.1
Any
More
Factors
?
Yes
No
7.3
Subfactors
?
Yes
No
7.2
Factor
at Entry
Level
?
7.5
Mark No
Knowledge
Analysis
No
7.1
Job
Aid
?
Yes
Yes
7.4
Job
Aid at
Entry
Level
?
No
7.6
Mark For
Process
Analysis
6

STEP 7 IS FURTHER SUBFACTOR*-TRANSFER ANALYSIS NECESSARY?

STEP 7 If other factors listed in STEP 6 need to be analyzed, repeat STEPS 6 and 7 for each.

If no subfactor-transfer analysis is necessary, go to STEP 10.

STEP 7.1 Choose one or a set of factors identified in STEP 6. Does a job aid exist for the consideration of the factor or factors?

If yes, go to STEP 7.4

If no, go to STEP 7.2.

STEP 7.2 Can a soldier at the lowest-ability entry level use the factors without further training?

If yes, go to STEP 7.5.

If no, go to STEP 7.3.

STEP 7.3 Can the factor be subdivided into several other factors? (see REMARK 1)

If yes, go to STEP 6 to conduct further subfactor-transfer analysis on the factors.

If no, go to STEP 7.7.

STEP 7.4 Can a low-ability entering soldier use the job aid without further training?

If yes, go to STEP 7.5.

If no, go to STEP 7.6.

STEP 7.5 Mark the factor or job aid to indicate that no knowledge analysis is required. Then go to STEP 7.7.

STEP 7.6 Mark the job aid to indicate that process analysis (STEP 3) is required. Then go to STEP 7.7.

STEP 7.7 Are there other factors which can be submitted to

further subfactor-transfer analysis? (see REMARK 2)

If yes, go to STEP 7.1.

If no, go to STEP 10.1.

REMARKS:

1. Factors listed in STEP 6 may be at too general a level of description for a soldier at the minimum acceptance level to be able to consider them effectively. If such is the case, break down each too general factor by asking the SME to identify and list any more specific factors which combine to form the more general factor. Repeat STEPS 6 and 7 until you have reached the minimum acceptance level.

2. Be sure to consider all factor before taking the branch to 10. It may be that some factors have a job aid while others do not.

3. At STEP 11., we will cycle back to STEP 3 to perform this analysis. For now, merely mark the job aid so you will remember that this analysis is necessary.

REFERENCE EXAMPLE

ANALYST: This factor, fuel storage requirements, is fairly broad and general. Are there other factors which must be considered in order to consider this one effectively? Can we analyze this factor furthers?
SME: We'll probably have to. It is pretty broad.
ANALYST: Is there a job aid--like a manual of some kind, to help the soldier consider this factor?
SME: Not really. He has to understand the whole concept of fuel storage requirements.
ANALYST: Could any entering soldier understand and use this factor without further training?
SME: No way it's complicated, special information. He'd have to be taught.
ANALYST: Can the factor be broken into more specific subfactors?
SME: Yes. It can. More specific things you should consider are thise

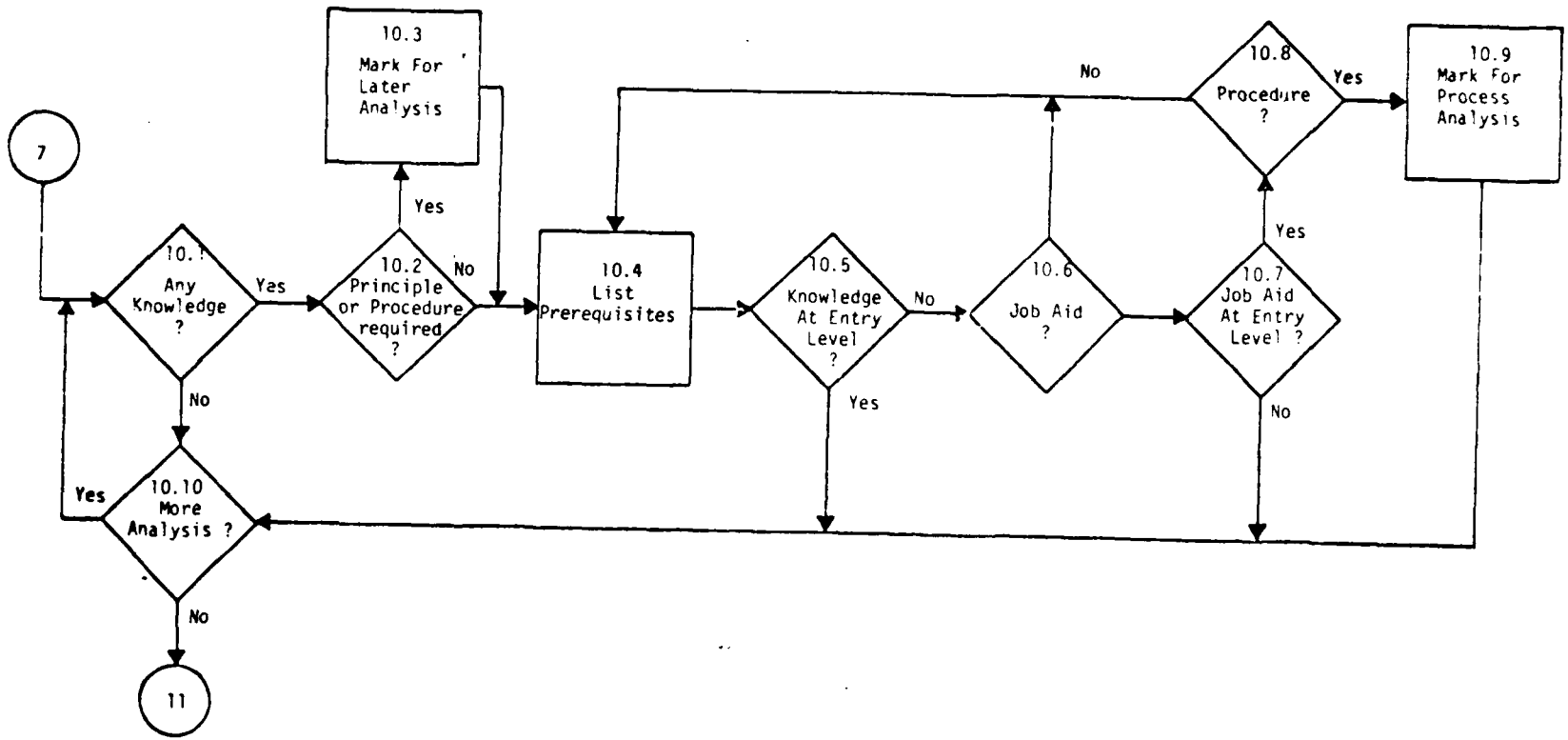
Distance between storage and generator
Type of position (defensive or offensive)
Whether the fuel is to be stored
Amount of fuel to be stored
Manner of restocking the fuel

ANALYST: Is this all?
SME: Yes.

(The analyst guides the SME back through the analysis (STEPS 6 and 7 for each of these subfactors. One recycling will be exemplified here.)

ANAYST: Ok, let's look at the first subfactor, the distance between storage and generator. Is there a job aid that will help the soldier consider this subfactor?
SME: Yes. Regulations specify allowable distanes.
ANALYST: Could any soldier use the regulations without being trained?
SME: Well, if he can read, he can use them. They're very specific.
ANALYST: You're saying that the soldier doesn't need any special knowledge to use the regulations? Good. I'll indicate that we need not conduct a knowledge analysis on this job aid.

(The analyst repeats STEPS 6 and 7 for each of the subfactors and for each factor identified in STEP 6. When all factors have been analyzed, the analyst continues to STEP 10.)



Knowledge Analysis

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS

With minor modifications this analysis procedure is the same as the knowledge analysis done with procedures.

Examine a factor* (from STEP 6 or 7) to determine whether or not there is any knowledge (i.e., any facts*, concepts*, procedures*, or principles*) that

--must be learned before the factor can effectively be considered and

--has not been acquired by soldiers who are at the minimum acceptance level.

STEP 10.1 Examine each factor from STEPS 6 and 7 except those marked no knowledge analysis required. Is there any knowledge (facts, concepts, procedures, or principles) that must be used to consider the factor? (see REMARK 1)

If there is, go to STEP 10.2.

If there is not, go to STEP 10.10.

STEP 10.2 Is a procedure or principle required in order to consider the factor? (see REMARK 7)

If yes, go to STEP 10.3.

If no, go to STEP 10.4.

If a procedure is required, mark to indicate that process analysis (STEP 3) is required for the factor. Then go to STEP 10.4.

If a principle is required, mark to indicate that principle-transfer analysis (STEP 8) is required. Then go to STEP 10.4.

STEP 10.4 Identify and describe with a label and/or a definition each concept or fact which is a prerequisite to the consideration of the factor. Determine whether the knowledge is a concept or a fact use the standard conventions. (see REMARKS 4, 5, and 6)

STEP 10.5 Has the required knowledge already been acquired by lowest ability entering soldiers?

If the knowledge has been acquired go to STEP 10.10.

If the knowledge has not been acquired go to STEP 10.6.

STEP 10.6 Is there a job aid which provides the knowledge required for the consideration of the factor? (see REMARK 2).

If not, go to STEP 10.4 to analyze for component concepts.

If there is a job aid, go to STEP 10.7.

STEP 10.7 Does a soldier at the entry level need additional knowledge to use the job aid? (see REMARK 3).

If yes go to STEP 10.8.

If no go to STEP 10.10.

STEP 10.8 Does the job aid require the soldier to learn a procedure for its use?

If yes, go to STEP 10.9.

If no, go to STEP 10.3 and identify the prerequisite facts or concepts.

STEP 10.9 Mark the job aid to indicate that process analysis (STEP 3) is required. Then go to STEP 10.10.

STEP 10.10 Are there any more factors which have not been submitted to knowledge analysis? Are there any of the concepts which were identified as a result of STEP 10.3 which are not at a level at which mastery can be expected for the entering soldier?

If all factors and concepts are at the entry level then go to STEP 11.

If there are more factors or concepts to analyze then go to STEP 10.1.

REMARKS:

1. Consider each factor separately in performing STEP 10.1.

2. A job aid is any source of information that a soldier can consult rather than learn the information him/herself. Some representative types of job aids are manuals, directives, maps, graphs, charts, tables, and human agents such as superiors and fellow soldiers.

3. In performing STEP 10, list all knowledge a soldier must possess before he or she is able to use the job aid. Such knowledge may include common knowledge (knowledge common to the use of all job aids) and specific knowledge (knowledge that is specific to the use of this particular job aid). Analyze each job aid and each piece of required knowledge separately.

4. In performing STEP 10.3, you may wish to consult a Basic Skills Expert as well as the Army SME in determining already-acquired knowledge.

5. Standard conventions are the numerical and flow-diagraming systems used to identify individual steps, pieces of knowledge, and relationships. For further information on the conventions, consult the appropriate section of this manual.

6. Carry out the conceptual analysis down to a lower level of knowledge than you believe necessary. SME's tend to overrate the minimum level of conceptual knowledge that may require teaching. By carrying the analysis a level or two below the anticipated level, you will allow for variations in soldier knoweldge and in needed instruction.

7. STEP 10.2 was not included when knowledge analysis was presented as part of the procedural analysis process. Because principles and procedures are potential prerequisites for factor-transfer tasks this step is required here.

REFERENCE EXAMPLE:

ANALYST: All right. Now we've broken down the task into steps and broken this step into detailed factors to be considered by a soldier at the minimum acceptance level of skills and knowledge. What I'm particularly interested in is identifying needed knowledge that soldiers at the minimum acceptance level don't have. Let's look at this factor for example "type of position." In considering this factor, what must a soldier know before he can learn how to make that decision? In other words is there any knowledge that the soldier must use to consider this factor?

("Type of position" is chosen and analyzed here for the purposes of a reference example. But all of the factors should be analyzed by the analyst.)

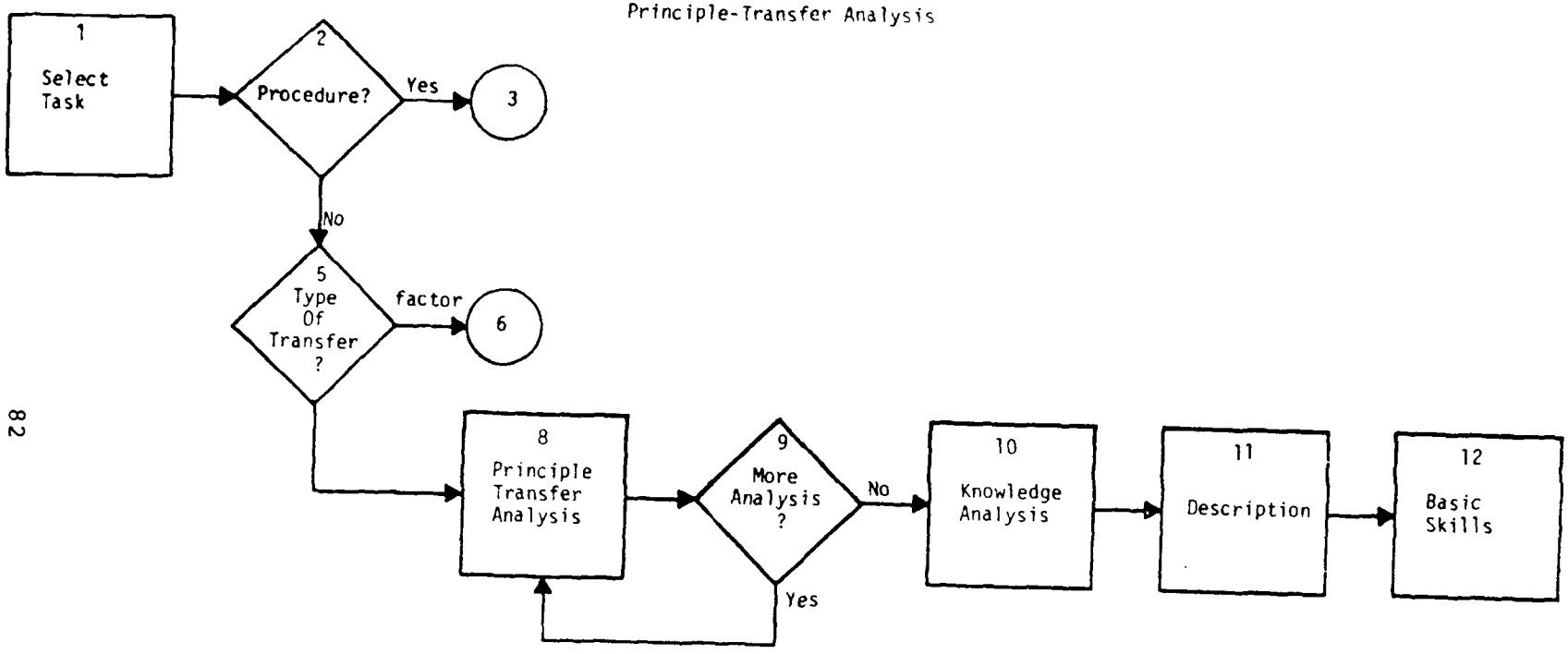
SME: Yes, a soldier must know what "offensive position" and "defensive positon" are. (Analyst decides these are concepts.)
ANALYST: Are there any procedures the soldier must learn before he can deal with the factor?
SME: No.
ANALYST: Any principles or rules?
SME: No, he just has to understand the terms.
ANALYST: Does any soldier know what "offensive" and "defensive" positions are when he or she enters the Army?
SME: No, they learn it here.
ANALYST: Is there some job aid the soldier can consult, or must he learn and memorize these definitions?
SME: Well, not really. He can look up the terms in an Army dictionary, but he has to learn them. They're very basic Army vocabulary.
ANALYST: But a job aid is available to help him learn them? And he could consult the dictionary anytime, right?
SME: Yes.
ANALYST: Ok, let's talk about the dictionary. Could any entering soldier use it without being taught?
SME: Probably not.
ANALYST: Would the soldier have to learn some procedure for using it? Or just some information?
SME: There's a specific procedure. He'd have to be taught it.
ANALYST: Ok, I'll note here that we have to analyze this procedure. We'll do it later.

(The analyst indicates that process analysis must be performed on the procedure. Then the analyst and SME return to STEP 10.4 to identify facts and concepts a soldier must know before he can learn to use the dictionary.)

ANALYST: Ok, we've finished analyzing this factor. Now let's look at another factor.

(The analyst and SME continue with the knowledge analysis of each factor. When all factors have been analyzed, they go to STEP 11.1.)
END

Principle-Transfer Analysis



OVERVIEW

PRINCIPLE-TRANSFER ANALYSIS

STEP 1 SELECT TASK.

STEP 2 IS TASK A PROCEDURE?

If it is procedural, go to STEP 3.

If not, go to STEP 6.

TYPE OF TRANSFER ANALYSIS

STEP 5 IS TASK FACTOR-TRANSFER OR PRINCIPLE TRANSFER?

If it is factor-transfer, go to STEP 7.

If it is principle-transfer, go to STEP 8.

PRINCIPLE-TRANSFER ANALYSIS

STEP 8 CONDUCT A PRINCIPLE-TRANSFER ANALYSIS

Identify and state (at the appropriate level of complexity) all the categories of principles, all the major principles within each category, and all common rules that are important or helpful for generating the right procedure at the right time for performing the activity well.

STEP 9 IS FURTHER PRINCIPLE ANALYSIS NECESSARY?

If there are other categories of principles listed in STEP 8 that have not been analyzed, repeat STEPS 8 and 9.

If no further principle-transfer analysis is required, go to STEP 10.

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS

For each principle, identify and list all the facts and concepts that

- must be learned before the principle can be learned at the application level, and
- have not been acquired by soldiers who are at the minimum acceptance level.

PREPARE FINAL REPORT

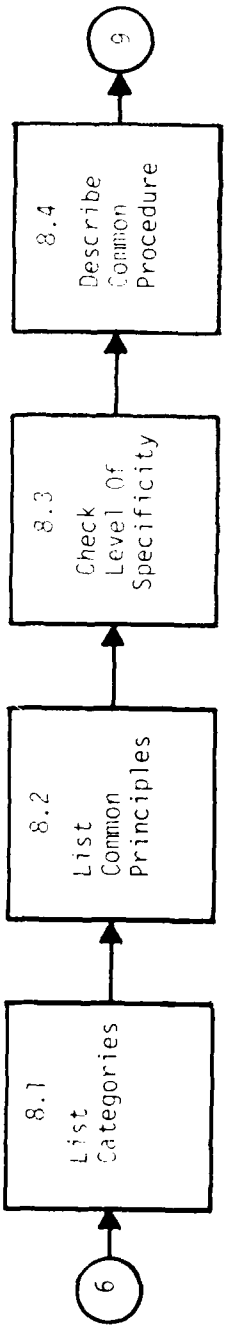
STEP 11 DESCRIBE THE RESULTS OF THE ANALYSIS

Review the entire analysis - complete all remaining analysis. Using the standard numerical and diagramatic conventions, prepare an integrated description of the results of the analysis.

STEP 12 IDENTIFY BASIC SKILLS

Have an experienced instructor review the results of STEP 11 and flag each step, fact, concept, and principle that is taught in a training course. The remaining steps, facts, concepts, and principles are basic skills which must be taught by BSEP.

Principle-Transfer Anaiysis



PRINCIPLE-TRANSFER ANALYSIS*

STEP 8 CONDUCT A PRINCIPLE-TRANSFER ANALYSIS

Identify and state (at the apropriate complexity) all the principles* that are important or helpful for generating the right procedure at the right time for performing the activity well.

STEP 8.1 Help the SME to identify and list all categories of principles that are necessary "underlying knowledge" for performing the activity well.

STEP 8.2 Take one category of principles. Help the SME to identify and state--at the level appropriate for the activity--the most important/common principles in the category. (see REMARKS 1 and 2)

STEP 8.3 State all principles of that category at the appropriate level of specificity for performing the activity. State the principles more generally or more specifically as appropriate. (see REMARK 3)

STEP 8.4 For that category, describe the common procedure* for generating appropriate procedures from the principles for a wide variety of specific situations. (see REMARK 5)

REMARKS:

1. Categories of principles tend to be associated with either steps of a general procedure or with a few fundamental principles at a general level of description. Therefore, it is helpful to ask the SME to consider each general step or fundamental principle in order to identify categories of principles.

2. Ask the SME to consider principles which the soldier must use to decide how to perform the activity. Then review the resulting list with the SME to ensure that all principles are stated at the same level of description.

3. Eliminate any principles which are unnecessarily detailed. Strive toward identifying that level of detail

which is sufficient for a soldier to perform the activity well.

REFERENCE EXAMPLE

Another activity that is used as a reference example for STEPS 8 and 10 is No. 867-793-3301, Draft a SIGINT Threat Briefing. The first level of analysis revealed six steps which are performed in order (making it a unitary procedural activity at that level of description). One of those six steps, identifying the type of briefing needed, is analyzed in the following example.

ANALYST: Let's look at the activity you described as identifying the type of briefing needed. How are important decisions made for this activity? Do you think about different factors that mut be considered? Or are there principles that you use in making decisions?

SME: There are principles that guide me. I have to understand how certain things influence other things. The princples help me to decide what to do.

REFERENCE EXAMPLE

ANALYST: I'd like you to think about those principles that you use in performing this activity. Are there some separate categories of principles? Can some or all of them be grouped together because they deal with similar phenomena?

SME: Well, they relate to the information you gathered in the first three steps. For example, there are principles governing the use of data about the audience---how to select the kinds of information you can present. That's governed by security classifications. Or how technical the briefing can be. You have to determine how much the audience knows and how much they will be able to understand of what you have to tell them.

ANALYST: What I hear you saying is that one general category of principles for selecting the briefing type deals with relating the audience's capabilities to their briefing needs. Is that right?

SME: Yes. Knowing who the audience is and what it can handle helps me to decide what kinds of information, how much, and how technical the briefing should be and what type of briefing is best.

ANALYST: Good. Now for that same step, are there any other general categories of principles?

SME: Well, there are principles which relate to the nature of the installation and its history of responding to SIGNIT collection threats. They help me to decide how I should focus the briefing, what kinds of briefings are useful for that kind of threat and that type of installation. I guess I think about these things first.

ANALYST: Is it accurate to say that this second category of principles relates installation needs and capabilities to briefing choices?

SME: Yes. The choice of the type of briefing involves those two groups of principles. Everything fits within the two categories.

ANALYST: I'd like to examine the two categories of principles we just identified. What are the most important principles for using what you know about the audience to select the briefing type?

SME: I guess the most important one is that you should select the type of briefing that takes greatest advantage of what the audience already knows---their technical knowledge. For example, a question-and-answer format isn't very useful for people who have limited knowledge of how to recognize or deal with collection threats. A straight information briefing is best for them. Another important rule is to select the type of briefing that meets the CO's needs. If he just wants his people informed, that's a different kind of briefing from what you'd use if he needs them to make a decision. Also, the

audience members may not all have the clearance to receive certain kinds of information; that may limit the kind of briefing you'd choose.

ANALYST: Good. What about the second group: relating installation needs and capabilities to briefing choices?

SME: OK. The type of threat and the installation's pattern of responses to threats is very important. You have to choose the kind of briefing that will best help the installation employ its resources to meet the threat. The more severe the threat, the more likely the briefing choice will involve opportunities for the audience to ask questions and get involved in making decisions. Also, the more technically competent the audience is, the more likely they will want to be involved.

ANALYST: I've made a list of the principles you have just described for step 4. Please check it over. Is it an accurate representation of what you said (see Figure 1)?

Principles for relating audience characteristics to briefing choices

1. The kind and level of information that can be presented depends on the audience's security clearance.

2. The kinds of technical content that can be presented depend on the audience's level of technical knowledge.

3. The needs of the command must be met as closely as possible through the kind of briefing chosen.

Principles for relating installation needs and capabilities to briefing choices

1. The briefing selected must be most likely to help the installation to overcome weaknesses and continue strengths in meeting threats.

2. The more severe the threat, the more important it is that the chosen type permit maximum opportunity for the audience to interact with SIGSEC staff.

3. The more technically competent the audience, the more likely they'll want to get involved.

Figure 1: Important Principles for Each Category

SME: Yes, I think these principles are the most important ones.

ANALYST: I'd like you to review all the principles you've descried and to think about how you use them in making

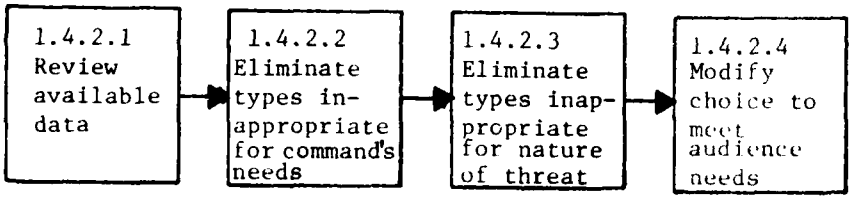
decisions. Think of a typical situation in which you would have to select a briefing type. What do you do first?

SME: Well, I look at the date I have about the audience, the nature of the threat, and the kind of installation. Then I eliminate kinds of briefings that don't meet the command's needs. Then, I consider the threat, what it is and how severe, and the installation's pattern of responding to threats. I select the type of briefing that seems most likely to make the people aware of what it is and how severe, and the installation's pattern of responding to threats. I select the type of briefing tat seems most likely to make the people aware of what they've done wrong in the past and how to improve. Then I modify that choice by considering the audience--what kind of clearance they have, how much they'll be able to handle of technical information, an the like. I make a final decision that way.

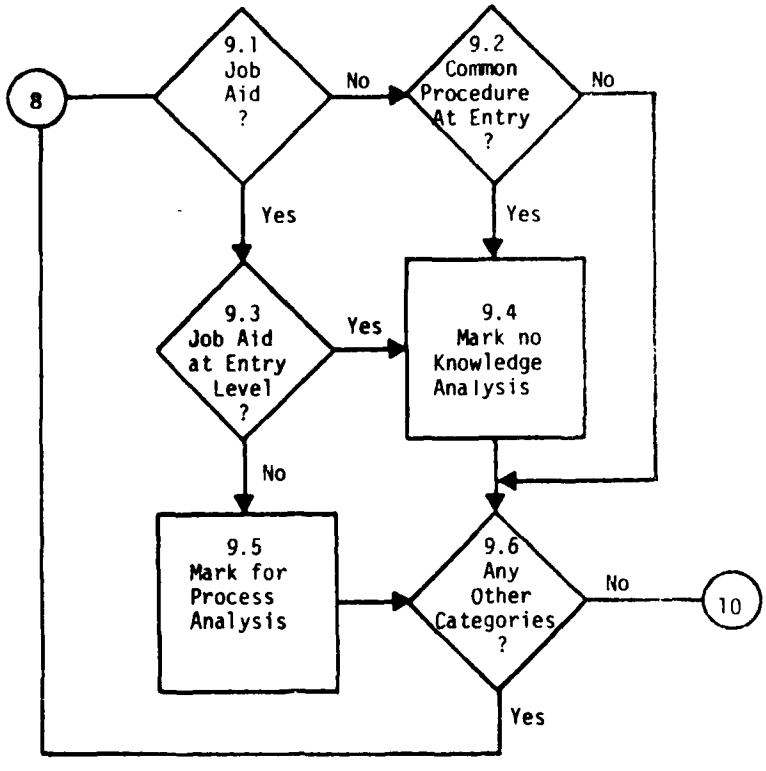
ANALYST: Do you follow that sequence every time you perform this activity?

SME: Yes, Consider installation first, then the audience.

ANALYST: Fine. I've drawn a diagram of this procedure. Is it an accurate description of the order in which you make necessary decisions?



SME: Yes, that's the way it's done.



FURTHER ANALYZE PRINCIPLES

STEP 9 IS FURTHER PRINCIPLE-TRANSFER ANALYSIS NECESSARY?

Ask the SME to examine the results of STEP 8.3 to make sure that all principles are at an appropriate level of detail and specificity for performing the activity.

STEP 9.1 Choose one category of principles. Does a job aid exist to help the soldier apply the common procedure? (see REMARK 1)

If yes, go to STEP 9.3.

If no, go to STEP 9.2.

STEP 9.2 Can a soldier at the lowest-ability entering level use the common procedure for that category without further training?

In yes, go to STEP 9.4.

If no, go to STEP 9.6.

STEP 9.3 Can a soldier at the lowest-ability entering level use the job aid without further training?

If yes, go to STEP 9.4.

If no, go to STEP 9.5.

STEP 9.4 Mark that no knowledge analysis is necessary. Then go to STEP 9.6.

STEP 9.5 Mark job aid to indicate that process analysis (STEP 3) is required. Then go to STEP 9.6.

STEP 9.6 Are there other categories of principles which have not yet been analyzed?

If yes, go to STEP 8.2.

If no, go to STEP 10.1.

1. Usually you will be analyzing a set of principles which relate to a given activity as a unit. When you get to knowledge analysis you will want to treat these principles one at a time. Make sure you have considered everything prior to going to knowledge analysis.

REFERENCE EXAMPLE

ANALYST: Now, I'd like to go back and examine each of the principles we just listed for each category. For the first category, relating audience characteristics to briefing choice, you've listed several principles that are fairly specific. Can an entering soldier apply these principles without needing any instruction at all?
SME: No, these are much too detailed for an entering soldier.

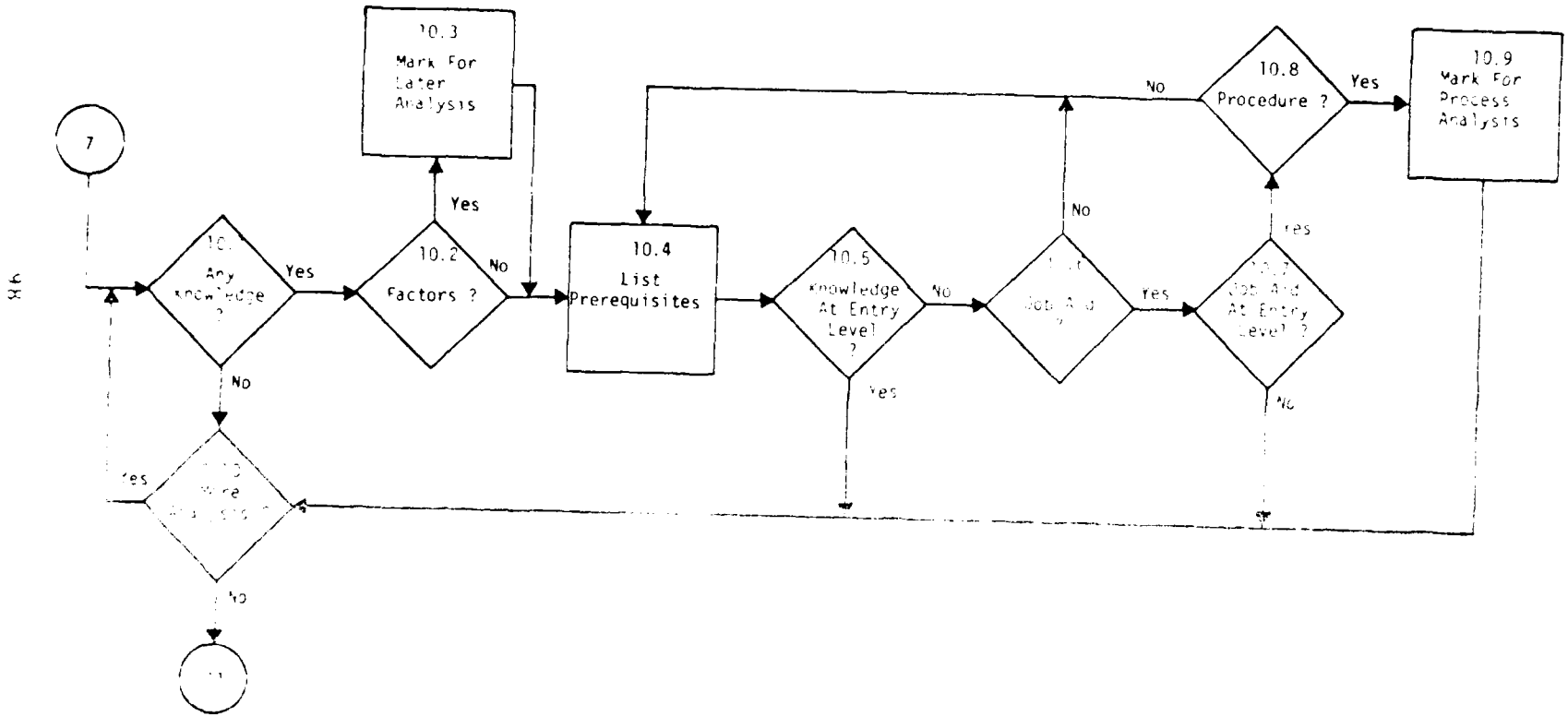
(Analyst decides that more analysis for principles is needed.)

ANALYST: Is there a job aid such as a manual that can help the soldier to follow the common procedure?
SME: No, there isn't anything like that. The soldiers must learn how to use the principle to perform the task effectively.
ANALYST: Could any entering soldier, even one with very limited skills and knowledge, use the common procedure without being taught?
SME: No, he'd need some training.
ANALYST: OK. We'll analyze the principles and the common procedure later. Let's look at the next category.

(The analyst will analyze these principles and their common procedure during STEP 10: Knowledge Analysis.)

ANALYST: For the category relating installation needs and capabilities to briefing types, is there a job aid the soldier can use to help him apply the common procedure?
SME: Yes, the technical manual guides him; it has a whole section on selecting briefing types in terms of the installation's capabilities.
ANALYST: Could any entering soldier use that manual without being taught?
SME: No, he has to learn how to use it.
ANALYST Ok, I'll note that we must conduct a process analysis on the common procedure; we'll do that later. Now let's look at the next category of principles.

(The analyst continues repeating STEP 9 for each category. After all categories have been anallyzed, knowledge analysis (STEP 10) can begin.)



Knowledge Analysis

STEP 10 CONDUCT A KNOWLEDGE ANALYSIS

With minor modifications this analysis procedure is the same as the knowledge analysis done with procedures and with factors. The exceptions are noted in the remark section

Examine each principle* and common procedure identified in STEPS 8 and 9 to determine whether there are any facts, concepts, procedures, or principles which

--must be learned before the principle can be learned at the application level, and

--have not been acquired by soldiers who are at the minimum acceptance level.

STEP 10.1 Examine each principle in each category from STEPS 8 and 9 (except those marked no knowledge analysis necessary). Is there any knowledge (facts, concepts, procedures or principles) that must be used to apply this principles? (see REMARK 2)

If there is, go to STEP 10.2.

Is there is not, go to STEP 10.8.

STEP 10.2 Are there factors which must be considered or procedures which must be executed in order to apply this principle? (see REMARK 3)

If yes, go to STEP 10.3.

If no, go to STEP 10.4

STEP 10.3 If factors must be considered, mark to indicate that factor-transfer analysis (STEP 6) is required.

If a procedure must be executed, mark to indicate that a process analysis (STEP 3) is required.

Then go to STEP 10.4.

STEP 10.4 Identify and describe with a label and or a generality each fact, concept, or principle which is prerequisite to the application of the principle under analysis. Determine whether the knowledge is a fact, concept or principle and identify with the standard conventions. (see REMARK 1)

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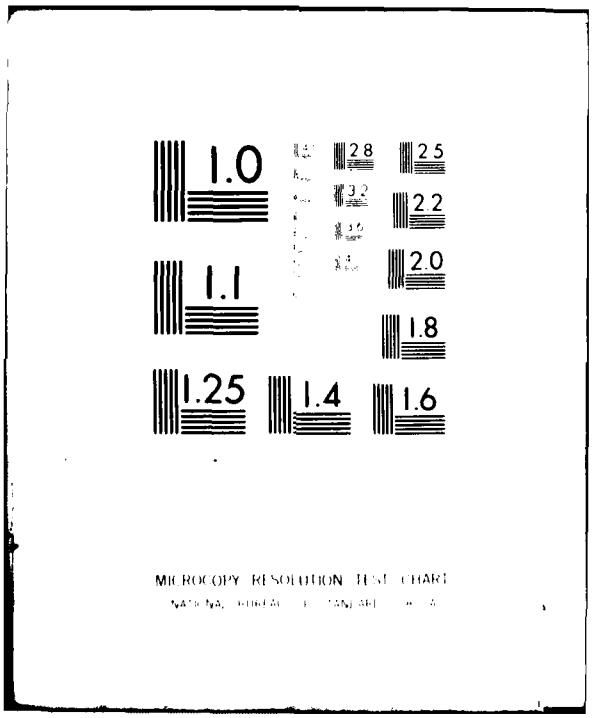
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MICROCOPY RESOLUTION TEST CHART

STEP 10.5 Has the required knowledge already been acquried by all entering soldiers?

If yes go to STEP 10.10.

If not go to STEP 10.6.

STEP 10.6 Is there a job aid which provides the knowledge required for application of the principle?

If not go to STEP 10.4.

If there is a job aid go to STEP 10.7.

STEP 10.7 Does a low-ability entering soldier need additional knowledge in order to use the job aid?

If yes go to STEP 10.8.

If no go to STEP 10.10.

STEP 10.8 Does the job aid require the soldier to learn a procedure for its use? Does the job aid require the soldier to acquire facts, concepts or other principles for its use?

If a procedure is required go to STEP 10.9.

If facts, concepts, or other principles are required, go to STEP 10.4.

STEP 10.9 Mark the job aid to indicate that process analysis is required. Then go to STEP 10.10.

STEP 10.10 Are there any other principles which have not been submitted to knowledge analysis? Are there any of the concepts which were identified as a result of STEP 10.3 which a soldier at the minimum acceptance level would not know?

If all principles and concepts are at the entry level go to STEP 11.

If there are more principles or concepts to analyze the go to STEP 10.1.

REMARKS:

1. During STEP 10.4, you must consider only one general principle at a time. Terminate the analysis when you have obtained a set of principles that are at the minimum acceptance level of knowledge.

2. When analyzing the concepts which must be learned, you will again be moving in the direction of increasing detail and specificity. Break down each concept and attribute-concept until you reach the minimum acceptance level.

3. Perform the conceptual analysis separately on each principle identified during STEPS 8 and 9.

4. You have probably noted that the analyzing of step 10.1 changes slightly for procedural analysis, factor-transfer analysis and principle-transfer analysis. The step is really the same but in each case the nature of the item being analyzed is somewhat different.

5. This step 10.2 was omitted when knowledge analysis is applied to procedures because principles are rarely prerequisite to the procedures at this level. For factors the step asks for principles or procedures; for principles (here) it asks for factors or procedures. The reason for these variations is evident in that we need to branch to the appropriate analysis procedure in each case.

REFERENCE EXAMPLE

ANALYST: Let's look at this principle: the kinds of technical content that can be presented depend on the audience's level of technical knowledge. Does a soldier have to know anything else to apply this principle?
SME: Yes, he has to know all kinds of technical content and has to understand how the audiences' technical level varies and what kind of effect that can have on the briefings.
ANALYST: Is there any procedure that SME should follow in using this principle: the kinds of technical content that can be presented depend on the audience's level of technical knowledge?
SME: The situation can change so much that there isn't anyone procedure that a soldier can follow.
ANALYST: Are there any factors that will be useful to consider in relation to the same principle?
SME: There aren't distinct factors to be considered.
ANALYST: Well then, if there are no procedures or factors, let's identify facts, concepts, or principles which the oldier needs to know in order to apply the principle? Does he need to kno the concept of "technical content" or does he need to know specific factors?
SME: Well he needs to know both.
ANALYST: OK. Well we have the concept of "technical content" and the fact of specific technical content.

(Analyst states the concept and the fact they identified using the standard conventions)

ANALYST: Does the soldier also need to understand the concept of audience's level of technical knowledge?
SME: Yes, he has to understand the kinds of variations ther can be, but there are no specific facts for him/her to know.

(Analyst states "audience's technical level" as a concept, using standard conventions)

ANALYST: Would an entering soldier know about different kinds of technical content or understand the idea of audience variation?
SME: No.
ANALYST: Is there any kind of job aid, such as a manual or anything else that would provide the soldier with this information.
SME: Yes, the soldier has to check the technical content with security classifications in regulations manual in order to make sure that he can present this information to his audience.
ANALYST: Does the soldier need additional knowledge in order to use the security classification manuals?

SME: Yes, he has to knw how to use this type of manual. It's different from other types.

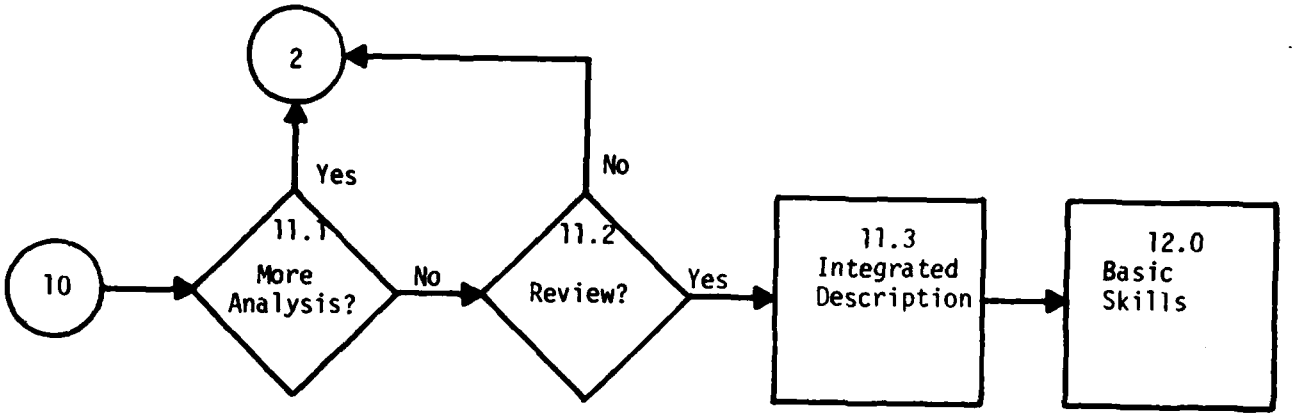
ANALYST: You're saying he has to learn a procedure? Ok, I'll note that process analysis (STEP 3) will be required for this procedure. We'll do it later. Is there anything else the soldier mus know in order to use the manual?

SME: No.

ANALYST: Now, let's look at another principle: The more technically competent the audience is, the more likely it is that they'll want to get involved. Would a soldier at the minimum acceptance level be able to apply this principle?

SME: No, he normally wouldn't. He would have to learn several concepts.

(Analyst turns to STEP 10.1 to conduct knowledge analysis for this principle.)



Review and Description

STEP 11 REVIEW AND DESCRIPTION

STEP 11.1 Review your analysis. Are there any steps, factors, principles, or job aids which were marked for process analysis, factor-transfer analysis, principle-transfer analysis, or knowledge analysis which have not yet been analyzed?

If so, return to STEP 2 to complete the necessary analysis

If no, go to STEP 11.2

STEP 11.2 Check the results of the entire analysis with at least one other SME or other source(s) of information in order to ensure that everything is complete and accurate. (see REMARK 1)

If the analysis is incomplete return to STEP 2 and complete the necessary analysis.

If the analysis is complete go to STEP 11.2 and prepare a final description of the analysis.

STEP 11.3 Using the standard conventions, (numerical and diagramatic) prepare an integrated description of the results of the analysis. (see REMARKS 2, 3 and 4)

REMARKS:

1. Other sources of information include soldier's manuals, technical manuals, and expert instructors. Use this STEP to ensure that the analysis just completed represents standard Army procedures rather than the preferences of a particular SME.

2. Combine the results of all three types of analysis---procedural, factor-transfer, and principle-transfer---into a single description that fully delineates how the entire task is to be performed and what a soldier must learn before he or she can learn how to complete the task. Make sure that it shows the following:

For procedural activities

a. The process description including all STEPS, order between steps, decisions, and branches

b. A more detailed substep process description for each step which is not at the minimum acceptance level.

c. Prerequisite facts and concepts for every step which requires this knowledge.

For factor transfer activities

a. All factors which must be considered for any factor transfer task.

b. Any subfactors which must be considered in considering factors.

c. Prerequisite facts, concepts, procedures or principles which must be acquired before a given factor or set of factors can be considered.

For principle transfer activities

a. The principles which must be applied before a give procedure or task can be executed.

b. The common procedure for using such principles to derive an appropriate performance for a given task.

c. Prerequisite facts, concepts, procedures and factors which must be acquired before a given principle or set of principles can be applied.

If no other steps, factors, or principles remain to be analyzed, you have completed the task analysis activities. Go to STEP 11.3 to prepare the resulting information for use in directing training development activities.

3. It may be useful to prepare a separate flow diagram or numerical description of the task activities first before attaching related supporting knowledge.

4. Be certain to use appropriate numbering conventions to identify all steps and knowledge and to indicate relationships among them.

STEP 12 BASIC SKILLS

STEP 12 Have an experienced instructor review the results of STEP 12 and flag each step, principle, concept, and fact that is taught in a training course. The remaining steps, principles, concepts, and facts are prerequisite skills and knowledges* which must be taught by BSEP.

REFERENCE SECTION

STANDARD CONVENTIONS

The next section contains a description of a possible set of conventions which may be useful in describing your analysis. For computerized analysis you may want to substitute a label system compatible with your needs. Be sure it preserves the distinction between the various kinds of analysis included within the extended analysis procedure.

GLOSSARY

The final section in this guide is a glossary which defines the new terms used. This should provide a useful reference tool for your use.

STANDARD CONVENTIONS

There will be an automated data base whose major purpose is comparing on a daily basis the different tasks and MOS's that are under analysis for purposes of identifying commonalities (so as to avoid duplicative efforts). However, the contractor may wish to train someone other than the analyst to input the results of the analysis into the automated data base. In this likely event, the analyst will want to use a more iconic set of conventions for describing the results of the analysis. Below is a description of the information that must be shown by such conventions (For more information about the conventions for the automated data system requirements, see the "System Requirements" documents).

Procedural Activities

There are two types of information that must be shown by the conventions that are used to describe the results of the analysis of procedural activities: (1) procedural relationships, and (2) learning relationships.

Procedural relationships include the following information:

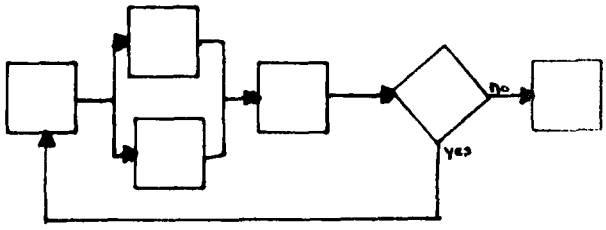
1. What each step is.
2. The optimal order for performing all steps.
3. Which steps are execution steps and which are decision steps.
4. Loops and branches.

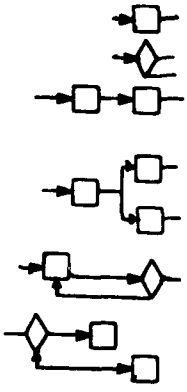
Learning relationships include the following information:

1. What skill or knowledge must be learned before another skill or knowledge can be learned.
2. The order in which those skills and knowledges must be learned.
3. What type of knowledge each piece of knowledge is (fact, concept, principle, or procedure).

The contractor must choose a set of conventions that provide that information. The following is an example of such a set of conventions, but they are presented here for purely illustrative purposes. The contractor should not feel constrained to use this particular set of conventions.

Procedural relationships. These can be shown diagramatically with the standard flowcharting conventions.





= execution step
= decision step
= the step on the left must be performed before the step on the right can be performed
= the two steps on the right can be done in any order, so long as both are done after the step on the left.
= loop
= branch

In addition, each box can be numbered so that a seperate list with corresponding numbers can show what each step is in considerable detail, complete with conditions and standards if so desired. The order in which the steps are numbered makes no difference whatsoever.

Learning relationships. These can be shown with the standard Army numbering conventions to number all boxes.

2.5.1.4. Skill/knowledge no. 2.5.1.4. must be learned before 2.5.1. can be learned, which in turn must be learned before 2.5 can be learned, which in turn must be learned before 2. can be learned.

In addition, a separate list with corresponding numbers can show what each skill/knowledge is in considerable detail, complete with conditions and standards if so desired. Finally, each number on the list can be followed by a letter to indicate what kind of knowledge it is. For instance, no letter could indicate the most common kind of knowledge (or skill)--a procedure (or task or step or skill or activity: all synonymous); C could indicate a concept; F could indicate a fact; and P could indicate a principle. (Note: these different types of knowledge are important to distinguish because they have different kinds of learning prerequisites and because they require different methods of instruction--an important concern for the next

part of the ISD process).

Factor-Transfer Activities

Again, there are two types of information that must be shown by the conventions used to describe the results of the analysis of factor-transfer activities: (1)factors/rules and (2)learning relationships.

Factors/Rules include the following types:

1. Factors.

2. Decision rules.

3. Common rules.

Learning relationships include the following information:

1. What knowledge must be learned before each factor/rule can be effectively considered/used.

2. The order in which that knowledge must be learned.

3. What type of knowledge each piece of knowledge is (fact, concept, or principle).

The contractor must choose a set of conventions that provide that information. The following is an example of such a set of conventions, but they are presented here for purely illustrative purposes. The contractor should not feel constrained to this particular set of conventions.

Factors/Rules. These can merely be listed under three headings: (1) factors, (2) decision rules, and (3) common rules. For the activity being analyzed, all factors could be grouped under a.1, all decision rules for the activity could be grouped under a.2, and all common rules for the activity could be grouped under a.3. Then each individual factor/rule would be numbered a.1.1, a.3.5, etc., depending on which type it is (The order is which the factors/rules are numbered makes no difference).

Learning relationships. These can be shown in an identical way as for procedural activities.

Principle-Transfer Activities

Again, there are two types of information that must be shown by the conventions used to describe the results of

the analysis of principle-transfer activites: (1) principles/rules, and (2) learning relationships.

Principles/Rules include the following:

1. Each category of principles.
2. Each principle in each category.
3. Common procedures.

Learning relationships include the following information:

1. What knowledge must be learned before each principle/rule can be used effectively.
2. The order in which that knowledge must be learned.
3. What type of knowledge each piece of knowledge is (fact, concept, or principle).

The contractor must choose a set of conventions that provide that information. The following is an example of such a set of conventions, but they are presented here for purely illustrative purposes. The contractor should not feel constrained to use this particular set of conventions.

Principles/Rules. These can merely be listed under three headings: (1) categories of principles; (2) principles, and (3) common procedures. All principles for the activity being analyzed could be grouped under a.2. Then each individual principle/rule would be numbered, as a.1.1, a.2.4, etc., depending on which type it is. (The order in which the category/principles/rules are numbered makes no difference whatsoever).

Learning relationships. These can be shown in an identical way as for procedural activities.

GLOSSARY

Activity - any mental or physical action carried out as part of a job responsibility. At its most general level of description, an activity is considered a task since a task involves at least one mental or physical act. A task can be broken into a set of component activities called steps which, when performed correctly and in the appropriate sequence, result in successful completion of the task. Each step may be further broken down into more specific activities called elements. Thus, at each level of description, any mental or physical act is referred to as an activity.

Basic Skills Expert - an individual with special expertise in teaching skills and knowledge which serve as prerequisites to Army tasks.

Branch - a step or a sequence of steps representing one option to be selected during a decision step.

Common Rule - a guideline for arranging the factors into the correct sequence for considering them during an activity.

Common Procedure - a set of steps for generating appropriate plans of action for performing a principle-transfer task in a specific situation (under one set of conditions).

Concept - a set or class of objectives, events, or ideas which share certain characteristics (called "critical attributes").

Critical Step - any step for which the consequences of an error are particularly severe.

Decision Rule - a rule (principle or procedure) based on the relevant characteristics of factors which assists or guides someone in making a decision.

Decision Step - a step in which a choice is made.

Defining Attributes - characteristics or features of a set of objects, events, or ideas that are shared by all members of the set and that serve to characterize the uniqueness of the set. Each defining attribute may be considered a component concept of the concept it helps to define.

Execution Step - any other kind of step except a decision step.

Fact - a single piece of information which expresses an identity that does not generalize to other specific instances.

Factor - a concept which characterizes a condition that must be considered in deciding how to perform an activity. It's use is similar to the Army's use of the terms "conditon" and "constraint." A factor is any situational aspect which controls, modifies, or limits performance in some way. For example, terrain obstacles constitute a factor which must be considered in establishing a COMSEC monitor site since the type and location of such obstacles modifies or limits the choice of sites for various facilities and equipment. Thus a factor can be considered as a category or class of conditions or constraints which affect decisions on how to carry out some activity.

Factor-Transfer Activity - an activity which requires a soldier to make decisions based on an analysis of categories of conditions and constraints existing in a particular situation. Such an activity cannot be broken down into a single sequence of steps. Instead, each separate arrangement of conditions requires that the activity be performed differently. Therefore, the soldier must understand what the important factors are and how they should be considered in order to generate the appropriate procedure for carrying out that activity in a particular situation.

Factor-Transfer Analysis - a kind of task analysis procedure in which considerations of important conditions or constraints help the soldier determine how to perform an activity.

Integrated Description - a description (numerical and diagramatic) which combines the results of the various analyses conducted with ETAP to identify both those activities required for performance of the task and the skills and knowledge required in order to learn how to perform each activity.

Job Aid - any source of information which a soldier can consult rather than learn the information.

Knowledge - facts, concepts, procedures, and principles that must be acquired in order to perform an activity.

Knowledge Analysis - an analysis of the knowledge that a soldier must have in order to learn how to perform an activity.

Learning Relationship - a hierarchical relationship among knowlwdges or skills which identifies what must be

learned before something else can be learned.

Level of Description - an amount of detail or specificity that is used to describe an activity.

Level of Specificity - an indication of the amount of detail involved in describing a principle.

Minimum Acceptance Level - the knowledge and skills possessed by the lowest-ability entering soldiers.

Optimal Procedurdal Order - that sequence of steps which represents an approved, efficient order for performing an activity.

Parallel Steps - two or more steps which can be performed in any order since they all follow after, or lead into, a single step.

Piece of Knowledge - a single fact, concept, principle, or procedure.

Prerequisite Skills and Knowledge - skills and knowledge which must be acquired before a soldier can learn something else.

Principle - a statement of a change relationship between two or more concepts describing how changes in one concept are related to changes in the other concept(s).

Principle-Transfer Activity - an activity which requires a soldier to apply principles in deciding how to perform the activity. Such an activity cannot be broken into a single sequence of steps. Instead, the soldier must select and combine relevant underlying principles which describe relationships existing in a particular situation. Understanding of these principles is required for successful performance of the activity.

Principle-Transfer Analysis - a procedure for analyzing tasks for which relevant principles must be used to generate specific procedures for performing the task in specific situations.

Procedure - a set of mental and/or physical actions to be performed in a particular sequence. The result of performing the sequence correctly is completed activity.

Procedural Activity - an activity that can conveniently be broken into a series of discrete steps.

Procedural Analysis - the process of breaking a task into its component steps and indicating the procedural

relationships among the steps. During this analysis, execution steps, dicision steps, and branches are identified and their order of performance specified.

Process Analysis - the process of breaking a task into its set of 5-10 separate steps, and of identifying decision and execution steps and branches.

Sequentially Prerequisite - steps which must follow one another in a particular order such that one step must be performed before another step can be performed.

Standard Conventions - the numerical and diagrammatic notation used to identify the elements in the analysis.

Step - a mental or physical action performed as part of a task.

STEP - a single step of the ETAP.

Substep Analysis - the process of breaking down a step into its set of component activities. The analysis continues through several successivley more detailed and specific levels if description until all actions are described in sufficient detail to be useful to a soldier at the minimum acceptance level of skills and knowledge.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